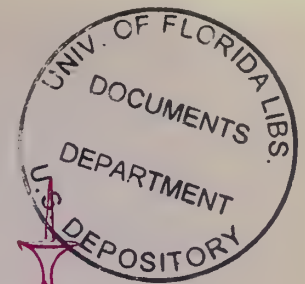


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Defense Management Journal

DOD MANAGEMENT IMPROVEMENT PROGRAMS



Volume VI, Issue No. 3 **SUMMER-1970**



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Cover—A scientist (p. 22) and a chaplain (p. 37) salute "The landscape of the past."

Defense Management Journal

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The Defense Management Journal is published quarterly by the Directorate for Management Improvement Programs, Office of the Assistant Secretary of Defense (Installations and Logistics), for distribution within the Department of Defense.

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Critiquing the Critics

It's open season on Government employees—all year. In this issue, several authors say it's turn-around time for the quarry.

- The Chairman of the Civil Service Commission urges every Government employee to “spread the word” above the din of “those who want to tear down the Government (by attacking) those things upon which public confidence is built.” Stand up to your critics, he says, or forfeit the field to “the militants and dissidents who seem to dominate our headlines.” (Page 3.)
- An Assistant Postmaster General scores several points against a more subtle, lower-key criticism of Government, i.e., the industry-can-do-it-better theme. He says: “Any businessman can be efficient when he does not have to take any losses * * * There would be much screaming and complaining * * * if private competitors (of the Post Office) had to deliver letters from Presque Isle, Maine to Pacific Grove, Calif. for the same rate they charge from New York City to Jersey City.” (Page 15.)
- Two managers in the Department of the Air Force assert that “not many private companies could receive the constant searching examinations given to DoD by Congressional committees, the GAO, the press, and its own in-house auditors and inspectors without revealing discrepancies that are relatively greater than those found in DoD.” (Page 6.)

Not all critics are without portfolio. Many come with credentials that bespeak enlightenment in the byways and folkways of bureaucracy.

- A management consultant offers the provocative theory that government could more profitably devote its energies to “identifying problems” than to “supplying solutions.” He contends: “If a problem has been identified and adequately defined the identification of a number of attractive solution approaches is normally not particularly difficult.” He suggests raising the “general level of the organization’s aspirations for progress” by finding problems that “demand” solutions. (Page 26.)
- The Director for Technology Planning in an R. & D. firm says government can take an organizational cue from private enterprise where, he says, small companies are much more innovative than big ones. He says the big ones rely on “evolutionary processes,” lack an “adventuresome spirit,” are seldom properly structured to welcome “radical” ideas, and “tend to invest in lower ‘for sure’ profits with low risks

instead of ‘might be’ high-potential ventures with high risks.” (Page 19.)

- The Director of the Defense Supply Agency moves this motivation-innovation issue out of the heady environs of the R. & D. laboratory into the hurly-burly of massed benches, lathes and conveyor belts where, he says, there is a crying need to find ways “for each individual to equate his contribution to the end product” through programs that are “integrated into the mainstream of line management.” (Page 34.)

No doubt about it. Informed criticism that hits the mark does stir progress—and kibitzing the management is a healthy, age-old pastime. An Army chaplain tells us (page 37) that Jethro founded a management consultancy while watching his father-in-law Moses attempting to dispense justice single-handedly to throngs of followers.

“What is this thing thou doest to the people? Why sittest thou thyself alone, and all the people stand about thee from morning unto even?” (*Exodus XVIII, V. 14-1*)

Thus was born the principle of decentralization. (We have it on authority of the chaplain.)

A military scientist relates how the civilian standard of living improved because military scientists of yore were critical of status-quo military technology—and he cites the double boiler, potato soup, canned food, etc. (Page 22.)

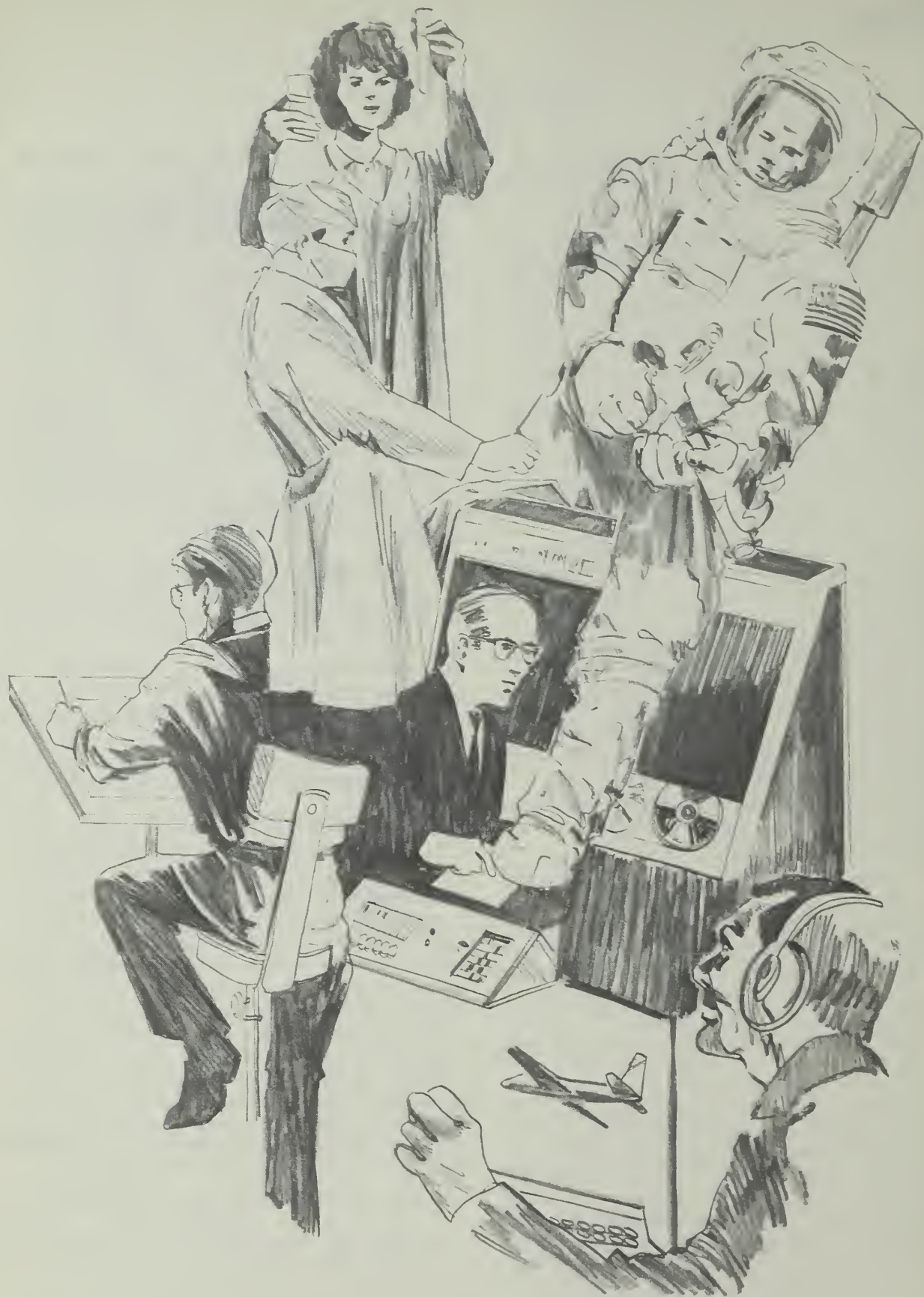
“Good managers are practicing critics” is the moral to be drawn from an experience related by a staff member of the President’s Committee on Employment of the Handicapped. He contends that only people critical of a wasting resource will take the trouble to convert it to a productive one. His experience deals with a manager who had enough heart to gamble on kindness and enough know-how to make that gamble return a dividend—both human and economic. (Page 50.)

Yes, “spread the word”—but not in reactive pique at every critic. Be discriminating. “I do not resent criticism, even when, for the sake of emphasis, it parts for the time with reality,” said Winston Churchill.

And—more important—accept the truth! Thin skins do impair vision—a thought that impels our chaplain (page 38) to quote from the Book of Proverbs.

“He that refuseth correction despiseth his own soul;

“But he that hearkeneth to reproof getteth understanding.” *Proverbs, 15, 32*



SPREAD THE WORD

IT IS ABOUT TIME we called public attention to the good things we do in government because we certainly hear enough of the other side from the militants and dissidents who seem to dominate our headlines.

As Chairman of the Civil Service Commission, I have a unique vantage point from which to watch the operation of this vast enterprise called the U.S. Government.

I see many of the complaints which employees direct to their Congressmen and union leaders. I hear the complaints of managers that our civil service system is inflexible and unresponsive. I hear the complaints of individuals who do not pass our entrance examinations. I hear complaints alleging discrimination against minorities and women. And I am very much aware of the serious labor problems we have.

We have many problems. In my opinion, there has never been a time of graver challenge to our country and to our Government.

- We are engaged in an unpopular war that everyone wants to end—but with widespread disagreement on how to achieve peace.
- We have critical urban problems that require ingenuity and initiative for solution.
- We are confronted with increasing costs of Government which are a threat to financial stability and a matter of very great concern to the taxpayer who bears the burden.

By **ROBERT E. HAMPTON**, *Chairman*
U.S. Civil Service Commission

“Many of the modern business and technical miracles which we accept casually today were pioneered by Government employees.”

- We have youth who talk about their desire for involvement and are impatient with a system that does not make changes quickly enough for their tastes.

When the critics add these problems up, they say—let’s abolish the establishment.

Nothing could offer less hope as a solution. While some Americans are trying to run away from these problems, our Government and its civil servants are working hard to solve them. But how do we get the true story of what is happening in Government to the public?

Where we sometimes seem to fall down is in the area of spreading the word—of letting the general public know about the accomplishments of the Government, and about the talent and ability we have in its ranks.

You may ask—why is the *image* of the Federal service and the civil servant so important? What is really significant, you might argue, is whether we perform efficiently and well.

But other factors are also involved. The opinion of the people about the quality of the Federal service has a direct bearing on our continued capacity to perform. This is why those who want to tear down the Government attack those things upon which public confidence is built.

Facing these problems, we need the best civil service this Nation has ever had.

We will need the best managers we can find.

We will need excellence at every level.

Because of these pressing requirements we also need the good will of all citizens. Fortunately, there is much solid evidence of accomplishments that breed good will.

Governmental operations today are both varied and demanding, requiring skills of a highly specialized nature. Civil servants control air traffic in and out of our overcrowded airports. They provide support services for the Armed Forces. They take care of social security, veterans benefits, and special services for businessmen, farmers, old people, and children.

Some of the finest engravers in the world work under civil service in the Bureau of Engraving and Printing. Scientists in Government laboratories are in the front ranks of those working to learn the secret of arthritis and to find a cure for cancer.

The Government employs leading surgeons in the Veterans Administration * * * outstanding test pilots with NASA * * * leading inventors, scholars, oceanographers, and monetary experts. In 1968 the Nobel prize for physiology and medicine was awarded to three Americans—one of them a present and one of them a past Federal employee.

There was no Nobel prize for Dr. Frances O. Kelsey, but she won the thanks of a grateful Nation when she blocked the use of thalidomide in the United States, and prevented the tragedy of thousands of malformed infants.

Many of the modern business and technical miracles which we accept casually today were pioneered by Government employees. It was a civil servant, for example, who developed the first electronic computer—and started one of the fastest-growing industries in the world.

Try to imagine modern cities without neon lights—another invention of a civil service employee. Other Federal workers developed drip-dry and stretch fabrics * * * frozen orange juice * * * and push-button aerosol cans.

And to top it all, when it came time for the first man to set foot on the moon, the feat was accomplished by a civil servant doing his own thing. Neil Armstrong has been a civil service employee ever since he finished college.

Government employees have a great deal to be proud of. But they must far outdo in the future anything accomplished in the past.

When I began my tenure as Chairman of the Commission, I expressed the thought that our personnel management system—though it is a good one—has had a piecemeal growth. I felt then that it needed a complete reexamination.

Some years from now, when people look back at the work of the Civil Service Commission during the 1970's, I think they will see that we did just that—began a

searching reexamination with the purpose of checking on what we were doing, where we were going, and how we planned to get there.

This reexamination is far from complete.

To support us, President Nixon has taken an unprecedented interest in the proper workings of the Government personnel system. On October 9th of last year he specifically addressed the heads of agencies throughout the Government, directing them to take action to provide the best possible system of personnel administration, in order to utilize, fully and constructively, the many talents and the excellence of the civil service. I think we can take this as direct evidence that the President fully appreciates the value and importance of our employees.

Not long ago, the President personally received all of the Civil Service Commission regional directors. In talking with them, he indicated his respect and regard for the career service. He urged that we do everything possible to bring outstanding people into Government, and to develop a high public appreciation of the career civil service.

Too often, the public hears only about the criticisms, the complaints, and the problems of Government employment. When we have successes, they are too often ignored under the theory that good news is no news at all.

Unfortunately, the range and importance of the work done by civil servants is not being sold to the public as well as the complaints are being sold. Yet there is no reason why the favorable aspects of Government employment should not be talked about day in and day out. Every civil servant has a circle of friends and acquaintances, most of whom probably know the extent of his experience in Government. So let me call upon him, as an individual, to talk about his job and about the favorable things he can say regarding Government service.

I put this in the same urgent category as standing up for this country when there are some members of the population who would prefer to tear it down.

I believe most Americans have a very deep love for their country, and instinctively rebel when the unwashed come along to insult the flag.

I think it is time that we break the silence on the good things, and that we stand up to the critics, and make our views well known.

There is a very old epigram, quoted by Oliver Goldsmith among others, to the effect that "silence gives consent."

Let it never be said that even by silence did any of us give consent to the unthinking, the unpatriotic, and the destructive attack now being mounted against our entire way of life.

I am personally proud to be a civil servant. I am proud to be an American and a member of the establishment, and I plan to say so as often as I have an opportunity. I hope every civil servant will do the same. □

WHO DOES THE INNOVATING? The authors conducted a survey of cost reducers. Their survey showed—???

	TRUE	FALSE
• Line management is more innovative than middle and upper management.	<input type="checkbox"/>	<input type="checkbox"/>
• Men “good with their hands” institute more savings actions than do “paper pushers.”	<input type="checkbox"/>	<input type="checkbox"/>
• Big organizations adopt savings ideas slowly.	<input type="checkbox"/>	<input type="checkbox"/>
• Federal employees are “empire builders.”	<input type="checkbox"/>	<input type="checkbox"/>

THE DECLINE AND FALL OF THE BUREAUCRATIC IMAGE

ROWAN AND MARTIN do a routine in their personal appearance tour that never fails to break up the audience. It is built around a supposed acquaintance of Martin's who always seems to have free time on his hands.

“I don't understand,” Rowan says, puzzled. “Doesn't he work for a living?”

“Of course not,” replies Martin indignantly. “He's in the Civil Service!”

Students of comedy will recognize this as a variation on a hoary bit going back to Joe Miller.

Students of public opinion will recognize it as a valid expression of how most Americans feel about Government employees.

Image of the Federal Employee

Indeed, anyone who has ever worked for the Government is familiar with the common reaction that:

- He took a Civil Service job only because he wasn't good enough to qualify for business or industry;
- He is overpaid;
- He is underworked, and a clock-watcher to boot; he keeps hours that would make a banker look zealous;
- He is a professional bureaucrat, a nitpicker who can always find 16 obscure regulations to justify not doing what should be done;
- Lacking the hard need to keep his ledger in the black, he is a fuzzy-minded, impractical dreamer who never in a million years could meet a payroll of his own;
- Knowing that he can't be fired, he is rude and contemptuous in his dealings with the people who pay his salary; he could care less about service to the public;

By SHERMAN M. FUNK
*Chief, Management Improvement
Programs Office
Headquarters, U.S.A.F.*

Major MARK A. McBRIARTY
*Cost Reduction Program Administrator
Management Improvement Programs Office
Headquarters, U.S.A.F.*

- Since he's not spending his own money, he squanders funds with a lavish and carefree hand;
- He uses management techniques which date back to the days of Millard Fillmore; innovation and imagination are totally alien concepts to him;
- His overriding concern is to expand his empire; if he can do this and shrink his workload at the same time, so much the better.

These, of course, are just for openers. The list goes on.

If the Government employee is a career member of the Armed Forces, his sins are even greater. Not only is he then guilty of all the failings which characterize the civil servant but, in addition:

- He automatically belongs to the military-industrial complex, a mysterious, self-serving and powerful force which battens uncontrollably on the public purse;
- He is a Prussian-like automaton, unable to think for himself, taking orders blindly either from someone above him in the military hierarchy or from some industrial fat-cat who keeps him in line by dangling the prospect of a lucrative job upon his retirement;
- With the vast resources of the Defense appropriation at his beck and call, he is even more profligate than his counterpart in the civilian agencies, and his errors are far more costly to the taxpayers; he goofs in billions, not millions;
- He may talk about peace but this is just lip service; what he really wants is a war large enough to guarantee bigger budgets and faster promotions yet small enough to avoid excessive casualties.

Here too, the list goes on.

Is there any truth in this image of the Government employee? Is there any validity to this stereotype of a bumbling mediocrity who desires only to feed quietly at the public trough for 20 or 30 or 40 years, making as few waves and upsetting as few applecarts as possible?

A standard cliché in Washington journalism is the "exit interview" with the political appointee who is leaving a sub-Cabinet post to return to his business or law firm. Virtually without exception, the official notes his surprise and pleasure at the competence of the career people he supervised. He admits that he entered the Government with all of the popular misconceptions and prejudice about the career service, but he is leaving convinced that the career people are at least as good as those in the private sector (and often, he says, "a helluva lot better"). As far as he is concerned, then, the prevailing image of the Government employee is all wet.

As far as the Government employees themselves are concerned, it is even wetter. Acutely, even painfully, aware of the prodigies of management required to operate the Federal Government efficiently, they resent being dismissed out-of-hand by a stereotyped caricature.

However, they are even more acutely (and, sometimes, painfully) aware of the political facts of life. No politician ever lost votes by denouncing the size of the establishment in Washington and the bureaucrats who inhabit it. For one thing, the nature of the system precludes the latter from fighting back. For another, they are fat targets; governments cost money to run, and that means taxes and nobody likes to pay taxes. Thus, politicians are assured a sympathetic hearing when they attack the swollen and mismanaged bureaucracy, and comedians are assured a laugh when they tweak the tail of a civil servant.

Government employees recognize all this, and are resigned to it * * * but it does not reduce their resentment.

Special Vulnerability of Defense

Of all Government employees, none are more vulnerable than those in Defense. The size of the DOD budget, the urgency of so many unfilled domestic needs, the unpopularity of the war in Vietnam, and the increasingly close scrutiny of Defense programs by Congress and the news media have combined to make the Pentagon a happy hunting ground for critics, with an open season the year round and no bag limit on game.

This surge of criticism places Defense managers in a difficult position. They know that some of it, of course, is warranted—just as some of the clichés about Government workers in general contain at least a kernel of truth. After all, people who work for the Government represent a cross-section of the American public, and any representative sample will include a few time-servers as well as a few men and women of great dedication.

But the people who work in Defense know also that not many private companies could receive the constant searching examinations given to DOD by congressional committees, the GAO, the press, and its own in-house auditors and inspectors without revealing discrepancies that are relatively greater than those found in DOD; indeed, given its millions of employees, its billions of dollars, and its astonishing range of missions and tasks, the wonder is that DOD performs as smoothly as it does. The people who work in Defense know that they perform with a devotion to the job that is rarely matched in the private sector, a devotion that can be confirmed any evening or weekend by a visit to the Pentagon (or any major military headquarters) parking lot, and comparing it to the parking lot outside any corporate office.

Most of all, the people who work in Defense know that they excel as managers, that their record as innovators is unsurpassed, and that they have in fact initiated many of the major advances in management during the past two decades; modern computer technology, for example, is very largely a spin-off of systems and techniques introduced first by Defense management.

Defense people know all this, but how do they make others aware of it? How do they, without subjecting themselves to the legitimate charge of generating self-serving propaganda, convince their critics that the *are* good managers?

Wrong Emphasis of Cost Reduction Program?

Late in 1962, a new program was established by DOD designed to lower costs and improve management. The new effort, called the Cost Reduction Program, attracted considerable publicity then and since. Most of this, however, centered on the savings claimed through the program, which were large enough to be dramatic. Comparatively little publicity was given to the second objective. It may be that this emphasis on dollars was, in the meaning of a favorite Pentagon term, "counter-productive," for it served to focus attention within DOD on the *apparatus* of the program (i.e., goals, preparation of reports) and outside of DOD on the *success* of the program (i.e., big dollar savings); the management actions themselves which provided the very basis of the program were played down.

This was unfortunate for several reasons. The stress on dollar savings gave credence to those who argued (inaccurately) that the whole thing was just a numbers game, and phony numbers at that. Much time was spent debating whether the savings claimed amounted to X.3 billion dollars or Y.2 billion, when such an argument was wholly irrelevant and probably unanswerable. The emphasis on reporting procedures, although it represented an honest attempt to identify with precision something which could never really be precise (an estimate of what was *not* spent), tended to obscure the far more important role of the program in stimulating and recording examples of innovative management.

Spotlight on Management Innovations

On July 1st, the Resources Conservation (RECON) program replaced the Cost Reduction Program (CRP). Although it retains some of the key features of the earlier effort, the thrust of the RECON program is consciously oriented toward a greater emphasis on management, as opposed to reporting. It preserves what has proven to be the most valuable contribution of the CRP, its motivational impact on management, a contribution which has taken on added importance in view of the rising criticism of DOD.

Each CRP action, and now each RECON action, must reflect—in the jargon of the business—"new, improved or intensified management." This means, simply, that each action reported must represent

something being done in DOD that was done differently, and less effectively, before the action was taken.

More than 200,000 such actions have been reported, and validated, since the inception of the CRP. These provide a unique window overlooking the world of talents and capabilities found among Defense personnel. The actions (not the savings they have produced but the actions themselves) provide a powerful refutation to those who think of DOD civilians as superannuated clerks with green eyeshades and rubber bands on their sleeves who haven't had a fresh idea since they discarded their quill pens, and to those who think that innovation among the military died out with the invention of the breech-loading rifle.

Who Does the Innovating?

It is therefore of some interest to study these actions, to see what they tell us about the kind of people in Defense who initiate "new, improved or intensified management" and what motivates them to do so, and to see if there is any recurring pattern in their rank, functional background, and organizational level.

Since the Air Force alone processes more than 16,000 validated actions each year, a sample was taken based on actions identified by committees and commanders throughout the USAF as meriting special USAF and/or DOD recognition. The sample numbered 232 individual actions taken between 1966 and 1969, a large enough number to provide equitable representation, yet small enough to permit detailed review of each. The following were determined for each action:

Rank or Grade of the Originator;

Organizational Orientation of the Originator;

Personnel assigned to administrative and logistical support positions were considered to be "staff" people. Those in operating activities were held to be "line." Admittedly, the distinction between the two may blur on occasion.

Functional Background of the Originator;

The originator's assigned job determined this classification. Thus, a person may have served for many years in Supply but if he was occupying a Transportation slot at the time of his CRP action, he is included in the Transportation function.

Mechanical or Procedural Action;

"Procedural," in this context, refers to a change in the way of doing something; "mechanical" describes those actions which resulted in a physical change to the item involved. For example, a new way of determining requirements for generators would be "procedural"; a new way of fungus-proofing the generator would be "mechanical."

Stimulus for the Action;

Each action was analyzed to determine whether its motivation arose from factors within the organization (i.e., internal) or from outside (i.e., external). These categories were further broken down to show as precise a stimulus as could reasonably be inferred.

Internal—Personal.—Actions which changed a situation obviously distasteful, irritating or dangerous to

TABLE 1.—Summary

	Number of actions (Percent of total)
ABOUT THE ORIGINATOR	
<i>Rank or grade</i>	
Airmen.....	(¹)
Non-commissioned officers.....	22
Wage-board employees.....	9
GS-8 and below.....	2
GS-9 and above.....	40
Officers.....	26
<i>Organizational orientation</i>	
Line.....	49
Staff.....	51
<i>Functional background</i>	
Supply.....	20
Transportation.....	9
Maintenance.....	26
Operations.....	29
Administration.....	13
Personnel.....	3
WHAT KIND OF ACTION	
Mechanical.....	40
Procedural.....	60
SOURCE OF STIMULUS	
Internal—Personal.....	10
Internal—Organizational.....	45
Total—Internal.....	1 56
External—Fiscal constraints.....	39
External—Technological change.....	6
Total—External.....	44
SHRINKAGE OF EMPIRE	
Personnel.....	9
Materiel.....	3
Function.....	3
Total.....	15

¹ Differences due to rounding. Where no figure is indicated, the number is not statistically significant.

the originator or to his colleagues. Example: Design of a new cable rack by a worker who tired of continually tripping over cables on a hangar floor.

Internal—Organizational.—Actions were arbitrarily placed in this category when there were no obvious benefits to the originator and they clearly were not attributable to outside pressures. Example: Decision by a range officer to employ a toy rocket for calibration purposes in lieu of a full-size rocket sled.

External—Fiscal Constraints.—Actions taken to assist an activity to perform its mission within reduced or allowable funding. (Austere funds were obviously a background factor in many cases. Actions were placed in this category, however, only when there was a direct relationship.) Example: Development of a new “in-house” maintenance capability to preclude expensive aircraft modification in a program hurt by cost overruns.

External—Technological Change.—Actions directly attributable to a change in technology or an advance in the state of an art. Example: Development of a reclamation process for engine components using new welding equipment.

Shrinkage of Empire;

“Empires” normally refer to the number of people supervised by the “empire builder.” In a very real sense, however, the amount of equipment or materiel controlled by someone is also an “empire.” Thus, the willingness of a manager to voluntarily surrender an item of materiel (not just to give up a manpower space or lose a function) is considered to be shrinkage of empire.

Conclusions of Study

Assuming that the sample reviewed was in fact representative, a number of conclusions are evident.

About the Originator

Together, airmen, Wage-Board, and low-grade GS employees furnished only 11 percent of the actions. Although one reason for this small percentage may be ascribed to the difficulty under the CRP of preparing and documenting a report of savings, the disparity between grades is too marked for this to be a key factor. It is possible that the traditional emphasis in the Air Force on a “grass roots” program may need reevaluation. If it is true that innovation does not percolate up from the bottom, as these figures seem to indicate, perhaps a proportionately greater thrust of the RECON program should be directed toward high-level and middle management.

The even split between “Line” and “Staff” confirms that innovative thinking is not restricted to either “headquarters types” or operators in the field; similarly, the wide diversity of functional backgrounds further confirms the need for any management program to be as broadly based as possible.

About the Actions

Most observers would intuitively guess that men “good with their hands,” the tinkerers and operators, would be responsible for the lion’s share of innovation. Not so. Three-fifths of the actions emanated from people who push paper or set policy. Here too, program redirection may be indicated, in this case to emphasize the roles of planners and administrators.

Any attempt to gage the motivation underlying an innovative idea is difficult at best, and the difficulty is compounded when the evaluator is restricted to judgment based only on a written report of the idea. Many elements may be at work concurrently, all of them nudging someone into recommending a “new, improved or intensified” management action; indeed, it is probably true that such multiple stimuli are the rule rather than the exception. The very human desires for recognition and reward (e.g., a Cost Reduction Certificate, a Cash Incentive Award, etc.) certainly are important causal factors, although they are virtually impossible to measure with precision.

Nevertheless, even with these *caveats* and allowing for a wide margin of error, the data illustrating the reasons why actions were taken is extraordinarily interesting.

The stimulus identified most often, by a fairly wide margin, is Organizational, i.e., no obvious benefits to the originator and clearly not attributable to outside pressure. Perhaps the operative word here is “outside.” Cynics may claim that *inside* pressure is what really counts, that what is needed to generate innovative thinking in a military organization is nothing more than a commander calling his men together and roaring, “All right, now, dammit, INNOVATE!” Perhaps, but experience with the Cost Reduction Program for the past 7 years seems to indicate that this may be true only in the wishful thoughts of those commanders who are a long way from meeting their assigned goals.

To be sure, the record is replete with CRP reports that were hastily prepared in May or June when attainment of goals was in doubt, reports that do little more than document actions taken much earlier in the year. It should be remembered, however, that the sample used in this article consisted solely of actions nominated for an award; in other words, the most original actions. It is unlikely that an action carefully screened and selected in the hope that it will receive wide visibility is the kind of *pro forma* savings report submitted only to help meet a goal.

This is why the high percentage for organizational stimulus is so interesting. It highlights the importance of such intangibles as esprit de corps and unit competition, intangibles which not only have long been stressed by military leaders but which are totally at variance with the stereotype of the Government employee described at the outset of this article. Another stereotype damaged (if not destroyed) by the data is

that large, cumbersome organizations are highly resistant to change, and tend to protect their own status quo at all costs. In action after action, evidence has accumulated that organizations do not move with the glacial rapidity attributed to them by legend but rather—given a popular and viable alternative—are capable of adopting a new procedure with quite astonishing speed.

Included in the organizational stimulus was the most obvious motivation of all: The simple desire of individuals to do a better job. Admittedly, this desire relies for its fulfillment upon the encouragement accorded by a favorable environment, an atmosphere which is conducive to change, an atmosphere which, ideally, rewards those who initiate change. The law of averages tells us that not all of the individuals who proposed a new way of doing something had such a favorable environment; many of them, undoubtedly, had to persevere through skepticism, obstinacy and, perhaps, even stupidity. The fact remains that their innovative actions *were* adopted, thus bearing out Arnold Toynbee’s thesis—the greater the challenge, the greater the response.

One of the most damning, and certainly one of the most frequent, indictments leveled against Federal employees—military and civilian alike—is that they are dedicated “empire-builders.” Folklore has it that any self-respecting bureaucrat moves to augment resources under his control whenever the occasion presents itself in the same instinctive manner that an attacking panther strikes for the jugular. A full 15 percent of the CRP cases studied, however, demonstrate the precise opposite: Resources under the control of the originators were *reduced*, deliberately reduced, because of their actions. It thus appears that individual or organizational aggrandizement may not be the governing characteristic of Federal employees after all, regardless of folklore.

There is a danger, of course, that concentration on the kind of innovative management surfaced through the Cost Reduction/Resources Conservation Program presents a distorted picture. Certainly, it would be wise to avoid sweeping generalizations about the quality of Defense managers based solely on CRP/RECON actions. If it is true that nearly 40,000 Defense people will initiate RECON actions this year, it is also true that over 3 million Defense employees will not; we are still looking at just the very tip of the iceberg. Nevertheless, at a time when DOD is on the defensive, the new RECON program offers assurance that a valid defense is readily available, a defense supported not by gut feelings alone but by hard evidence that there is a sizable and growing number of military and civilian employees of the Department for whom innovative management has become a way of life.

The old image may not yet have disappeared, but perhaps it has finally begun to crack. □

Foreword

This article is different from most professional articles for two reasons. First, I hope it is written in a style that is more a narrative one than an expository one, full of mental challenges. Second, this is the first article that I have written, hoping that it becomes outdated before it is published.

That last statement requires explaining. Writing about management in the Postal Service of necessity uncovers an almost incredible list of managerial constraints. The lack of managerial flexibility resulting from those constraints and the inability to control properly the myriad events shaping effectiveness and efficiency, motivated postal leadership in 1966 to seek one of the most innovative solutions in the history of public administration in this country. As this article is being written, legislation to convert the Post Office Department into a semiautonomous Government-owned enterprise is active in both houses of Congress; hence, the sincere hope that much of what is said here will be history when read; but I am ahead of the story.

Since Benjamin Franklin labored as the first Postmaster General, observers in every walk of life have judged the Postal Service. The mail system is one of the few giant organizations that many Americans, unexposed to its realities, feel they can manage better than those charged with the responsibility. Proper exposure, however, to the complexity of the postal system usually produces new-found humility and even some admiration for those who manage one of the world's largest business-type activities under enormous restrictions unparalleled by those in any other business activity. This article attempts to justify that rather consummate statement. Additionally, in a few paragraphs, an attempt is made to lay at rest two rash and specious comparisons of efficiency between the Postal Service and the telephone and telegraph industry.

Ronald B. Lee
Ronald B. Lee



KNOW YE WHAT YE JUDGE

(Realities about the U.S. Postal Service)

"NO CONTROL"

DURING THE appropriations hearings on the fiscal year 1968 budget, Mr. Steed (D. Okla.), the chairman of the Subcommittee on Treasury, Post Office, and the Executive Office of the President, in the House of Representatives, said: "General, [addressing the Postmaster General] in some degree by matters beyond anyone's control, in some degree by act of Congress, and by other legal requirements, would this be a fair summary; that at the present time, as the manager of the Post Office Department, you have no control over your workload, you have no control over the rates of revenue, you have no control over the pay rates of the employees you employ, you have very little control over the conditions of the service of these employees, you have virtually no control, by nature of it, of your physical facilities, and you have only a limited control, at best, over the transportation facilities that you are compelled to use—all of which adds up to a staggering amount of 'no control' in terms of the duties you have to perform."

As staggering as the above list appears, the whole story is not told. To that list could be added very little or no control over the:

- use of revenues—\$25 million of postal revenues are deposited in Treasury accounts each banking day;

- level of expenditures provided each year through the annual budget process—national goals determine those levels;
- the determination of product lines or product mixes—Congress establishes these;
- right of employee organizations to lobby for their interests with Congress if they are dissatisfied with management decisions;
- recruitment, certification, hiring, and firing of its field managers (postmasters)—Senate must advise and consent;
- recruitment, certification, hiring, and firing of its top managers (Assistant Postmasters General at Headquarters)—until 1969, these appointments were largely party and political committee controlled;
- continuity of management—Winton M. Blount is the sixth Postmaster General since 1960;
- numbers of top managerial positions—Congress must vote on supergrades and presidential appointee positions;
- size of its investment budget—appropriation of Congress, not determined on a return on investment basis;

By RONALD B. LEE

***Assistant Postmaster General
for Planning and Marketing,
Post Office Department***

ED. NOTE: Subsequent to submission of Mr. Lee's article, the postal reorganization bill was approved for implementation.

- negotiating requirements for transportation contracts—the Post Office Department must accept the rates established by the Interstate Commerce Commission and the Civil Aeronautics Board irrespective of the ability of the Department to negotiate lower ones directly;
- transportation schedules to which the Post Office Department is tied—the Department is captive to the schedules established by the common carriers;
- rate of construction of facilities—funds for facilities built by the Postal Service must be committed in each single budget year;
- numbers of people that can be hired or that can be transferred among organizational elements;
- expenditure of funds among appropriations—for example, if an anticipated workload increase of 5 percent does not materialize, the surplus money in the Operations account cannot be spent for capital investment, no matter how well justified;
- amounts provided for training the mammoth work force.

Obviously, due consideration cannot be given each item. A substantial article could be written on each area of “no control.” If one peruses the list, even the most staunch critic of the Postal Service will have to admit that these constraints far outdistance those of any private industry. A due respect to your intelligence, however, demands that some areas be explained partially.

FUNDING—Unlike most other Government agencies, the level of postal expenditure is determined by user demands rather than national policy. For example, Agriculture, Defense, Labor, Interior, Commerce, etc., can simply cut back on the level of expenditure of some of their programs if funds are not provided. The Post Office Department, however, must handle all mail presented to it regardless of available resources. Postal revenues flow directly to the Treasury; they are not available to postal management. Every dollar the Post Office Department spends must be appropriated by Congress, even though over 80 percent of expenses are earned from mail users. Since budget estimates are prepared 18 months in advance, fluctuations in demands for service often mean that income and outgo do not match.

Further complicating this matter is the fact that each chamber of Congress has two committees dealing directly with postal affairs—one that sets rates and writes the laws that govern postal activities and one that appropriates funds. One committee decides what business the Post Office Department is in, what charges will apply, and what wages will be paid, while an entirely separate committee appropriates funds that often do not permit the Department to give full effect to the decisions of the authorizing committee. For example, wage legislation is in no way based on the ability of the Post Office Department to pay the wages.

LABOR-MANAGEMENT RELATIONS—Under the current system, it is possible for postal employees to appeal directly to Congress and have written into law concessions that it cannot freely get from management. The list of top-spending lobbies on Capitol Hill is not headed by the American Medical Association, the National Rifle Association, or the American Legion, but by the National Association of Letter Carriers.

TRANSPORTATION—There are statutory restrictions on the Department's authority to select among carriers and among modes for mail transport. These restrictions, such as rigid bidding procedures for highway contracts, a requirement to divide loads equally among competing airlines, and special Civil Aeronautics Board and Interstate Commerce Commission authority over rates paid to carriers, have no direct relationship to the needs of the service or to least cost alternatives.

MANAGERIAL CONTINUITY—The Cabinet position of the Postmaster General means that his term of office is usually limited to that of the President in office. Even in cases in which the party in power remains in office, the Postmaster General is often changed. The mean length of service of Postmasters General is 3 years and 4 months, but that figure includes some long terms like those of Granger (12½ years), Farley (8 years), and Summerfield (8 years). The median, a truer measure in this case, is 2 years and 5 months. Postmasters General and their top staffs often initiate programs that might prove beneficial to the Postal Service were they given the opportunity to see them through to maturation. With such short tenure, however, top management usually develops a natural tendency to place emphasis on those activities that will provide greatest immediate visibility.

The brief list of “no” and “little” control above *should not* be construed as one of complaints. The form of the Postal Service has been decided by the American people through their elected representatives, and no manager in the Postal Service is recommending any departure from the form of determination. Rather than complaints, the short list is merely a disclosure of some of the differences between the environments of the Post Office Department and the industries in the private sector with which it is compared so frequently and erroneously.

POSTAL EFFECTIVENESS—From time to time columnists attempt to demonstrate that Government management is less effective than private management by comparing the Postal Service with our privately owned telephone system. The approach cannot even be characterized as comparing apples and oranges. These two fruits are alike throughout much of their taxonomy. Comparing the telephone system and the mail system is more like comparing a small tree with a giraffe. There



The author, at left, discusses the "reality" of managerial planning for the Post Office Department with Postmaster General Winton M. Blount.

might be a similarity in size and they both might be living things struggling for survival in the same general environment but the similarity ends right there.

Typically, as this argument goes, the increasing rate for first-class postage is compared with the decreasing rate for selected long-distance telephone calls. The analysis fails to recognize that postage is the only user charge the mail customer pays, while the costs to the telephone user consist not only of the long-distance charge but the monthly "customer charge" covering the installation and "maintenance" of a phone in the home or office. While the actual costs of selected long-distance calls are decreasing, the costs of placing and maintaining the equipment in the home are increasing and bear no resemblance to the cost incurred by the telephone company for that service. For example, postage rates are established based on a formula of cost coverage. One might question whether the more than \$1 extra per month for a longer cord is based on any such equitable cost-based formula. Additionally, the allegation is frequently made that postage rates are terribly inflationary because first-class rates have risen some 75 percent 1932 and 1968, while the cost of living has risen a lesser amount. That analysis fails to consider that the original price might have been grossly understated to permit freer access to a nationwide communication system for broad segments of the population. Percentages mean very little without considering absolute levels and concomitant benefits. Our monetary system makes it quite impractical to raise the first-class rate less than one penny. It takes no mathematical genius to compute that the recent increase from five to six

pennies is a 20-percent increase. The out-of-pocket costs to the average American, however, are decreasing over time on a relative basis. In 1932, when first-class postage was 3 cents, the American of median income worked 4 minutes and 6 seconds to earn that 3 cents. Today only 1 minute of his work day is needed to buy his 6-cent stamp. Further, such comparisons fail to consider second- and third-class rates, which together account for most of the business mail. There have been smaller increases in these classes. If one compares the increase in newstand rates for newspaper and magazine with the increase in postage, he will see that, by any measure, postage is less inflationary.

	2d class rate	Newsstand rates			
		N.Y. Times	Time	Life	
1932 . . .	\$0.03 per pound.	\$0. 02	\$0. 15	\$0. 10	(1936)
1970 . . .	\$0.078 per pound.	. 10	. 50	. 35	

ACCESSIBILITY—There are still many areas in this country in which one cannot get telephone service. There are many areas in which one must pay hundreds of dollars for multiparty line access. These fees must be paid whether or not the phone is ever used. Mail service is provided at equitable cost to all Americans. Even in metropolitan areas, telephone service is not equitably priced. Why do telephone

calls in New Orleans, Baton Rouge, Alexandria, and other cities in Louisiana still cost 5 cents when they cost 10 cents in metropolitan areas in other States?

The comparison between a telephone call and a piece of mail is a tenuous one to be sure, but it is used by antagonists. In numbers, the telephone system handled somewhat over 40 billion calls in 1969. The Postal Service handled approximately 83 billion pieces of mail (an average of nine times each) over that same period.

How many times have you dialed a number and gotten a busy signal, lost a dime in a pay phone, been disconnected, or not reached your party for other reasons? A good wager might be that the average adult experiences at least one of these conditions each day, or approximately 3,500 in a 10-year period. Contrast this number with the number of letters that you have sent that have gone astray. In this instance, a fair bet might be that the average adult has not lost more than one letter and has not had more than 25 to 50 delayed over his *entire lifetime*. In fact, it can be further stated that the average adult has probably had a compensating number of pieces of mail that have been delivered extraordinarily fast. Those receiving good and exceptional service are not the ones who write letters to the editors or who vociferously mount the soap boxes. Again, it is admitted that the comparison of telephone calls with pieces of mail is not on rock foundation, but the comparison did not originate with this paper. The important question is "Is completion of the communications link a valid measure of effectiveness?" If it is, one cannot, in good faith, rate any communications service better than the mails.

Furthermore, if one were to use unit costs per communication, again equating telephone calls with pieces of mail, he will find that total postal expenditures divided by total volume amounts to about 7.2 cents per piece, whereas total A.T. & T. expenditures (minus taxes because the Postal Service does not pay taxes) divided by total telephone calls comes to about 9 cents per call. Is this a valid relative measure of message cost? If it is, no rational person can call the Postal Service inefficient. If it is not a valid measure, strike it from the record.

DEFICIT—What is the postal "deficit?" The postal deficit is the result of subtracting operating expenditures from revenues. The deficit is used for rate-making purposes and for the determination of new amounts of spending authority for the next budget year. Those who point to the current deficit position of the Postal Service as a measure of managerial inefficiency are evidently unaware of financial limitations placed on the Postal Service. For example, most big businesses invest in interest-earning activities; the Postal Service cannot. Busi-

nesses in the private sector use their revenue for their own purposes; the Postal Service turns its revenues over directly to the U.S. Treasury.

There are two sides to the deficit equation. If Congress had set postal rates at higher levels there would be no deficit. Private utilities have little difficulty securing rate increases from State and Federal regulatory commissions when they can demonstrate their costs are rising. Congress has decided on the other hand to "let" the Post Office run a deficit.

A well-known private banking concern uses its money order float of more than \$25 million to invest and earn interest. This amount of money, resulting from the buildup caused by the elapsed time between sale and redemption of money orders, amounts to several times that many dollars in the Postal Service; but it is not usable by the Service for its own benefit. That amount, like postage revenue, is used by the Treasury to produce revenue. Additionally, the Postal Service buys all of its buildings; it buys all of its vehicles, its machinery and its equipment *out of its annual appropriation*. Most businesses assess fixed plant and borrow against that asset.

The Congress provides a public service allowance for services the Postal Service provides to the blind, certain eleemosynary groups and certain subsidies. The public service allowance for the last complete year of figures was approximately \$700 million. Subtracting from the total accounting deficit of \$1.2 billion, the so-called operating deficit position of the Postal Service is approximately \$500 million. In other words, this is the postal contribution to the Nation's long-term debt.

It may interest you to know that, at the same time the Postal Service is carrying its deficit of \$500 million without the use of the marketplace for investment and without borrowing on fixed plant, A.T. & T. is carrying a long-term debt of over \$10 billion, with full use of the marketplace for investment and more of a de facto monopoly than the Postal Service with a pseudo monopoly only in first-class and some third-class mail. Is the size of long-term debt a valid measure of efficiency?

Let us assume that for the last 30 years the Postal Service had been allowed to invest its revenues. For ease of calculation, let's eliminate the incremental nature of receipt of revenue and assume that it is invested as a lump sum at the end of the year. Using the formula for compound interest at 4 percent (a conservative average of market activity after cost of capital over the last 30 years), we arrive at a gross figure of \$7,375,492 in interest that would have been available to the Department to pay off its operating deficit. That is not a bad figure for 30 years of interest, especially when one considers that the Postal Service has been turning its revenue over to the Treasury for more than 190 years.

Now let us make the same calculations for money order float. Since all of the Postal Service expenditures

have been subtracted from revenue, this amount is available for market use. Taking a mean money order float figure and computing its compounded return over the last 30 years at 4 percent return produces \$400,900,000. This amount could be returned to the "stockholders" in a business. BUT, wait a minute! The "stockholders" have not *paid* anything for the privilege of receiving dividends. The reader has probably noted one big flaw in this argument. If the receipts of the Postal Service are gathering interest, how do operating expenses get paid? Were the Postal Service a private organization, it could float stock for its initial capital and sustain that level through the operation of the marketplace. In fact, at the average price 30 years ago for A.T. & T. stock (\$130 per share) multiplied by the 18,686,794 shares that were outstanding January 1, 1968, the Postal Service could have covered its expenditures by 300 percent in 1938 and could have easily sustained this coverage through investment of revenue.

Summarizing this presentation on deficit, we find that instead of an actual deficit, the Postal Service could have, in the last 30 years alone at the rate of 4 percent of capital done very well financially. Admittedly, the Postal Service does not pay taxes and no attention is paid to that fact here. It can easily be understood that taxes only juggle the figures. They do not refute the whole argument.

Although this has been a very brief explanation of the nature of what is called a "deficit," an attempt has been made to prove that such a figure is meaningless as a measure of efficiency. It is valid for ratemaking and determination of budget requests only.

COMPETITION—The Postal Service is not a monopoly. The Private Express Statutes require that, on private correspondence, sufficient postage appear. If there is a 6-cent stamp on your letter, anyone can transport and deliver it. There are absolutely no restrictions whatever on the collection, processing, transport, or delivery of magazines, newspapers, general advertising and parcels, and many organizations exist to compete in these areas. There are cases in which private companies handling these classes of correspondence do so at less cost and more effectively than the Postal Service because they select only the easiest and most profitable areas in which to operate. It is obvious that there are limitations as to what will and will not return a profit. The Department's private competitors are in business to make money, not provide a service available to all Americans at equitable prices. If the Postal Service cut out mail delivery by mule and horse, by ski plane in Alaska, by boat to islands and the 44,000 rural carriers, it could probably show a profit in delivery services. But is that the reason the Postal System exists—to make a profit?

Those who would point to the private competitor as more efficient must consider that the private competitor is interested only in the profitable areas. The result of

turning the whole Postal Service over to private industry would be to dry up those who do not live in the so-called mainstream of communications routes. That is the primary reason a Government corporation with service to all is the recommendation in the legislation before this Congress.

Any businessman can be efficient when he does not have to take any losses. Private competitors are secure as long as there is a Government Postal Service spreading the losses in unprofitable areas over a tax base supported by 200 million people. What would have been the impact of the United Parcel Service strike in New York if the Postal Service had not been there to accept the 50 million parcels involved? There would be much squirming and complaining, however, if private competitors had to deliver letters from Presque Isle, Maine, to Pacific Grove, Calif., for the same rate they charge from New York City to Jersey City. Don't kid yourself. The private companies are only interested in taking from the Postal Service the highly profitable metropolitan area to metropolitan area traffic. Even in these instances, the mails are often used by competitors because they cannot afford to establish the transportation alternatives now open to the Postal Service.

MANAGERIAL CAPABILITY—Argument is frequently made that Government managers are not as competent as those in the private sector, and the measures of efficiency cited above are used to prove the point. Several well-known facts can be used to refute this argument.

If that statement is true, why are so many private companies continually seeking Government executives to assume top managerial positions in their firms? Why are so many military men (who should be the most bureaucratic of the bureaucrats) sought for industrial positions paying many times their military salaries? It might be rationalized that premium is paid because these individuals can influence sales and can instruct other company executives in how to structure proposals and better meet technical requirements. Is this managerial capability? The contention here is that it is.

In the major countries of the world, telephone systems return a profit; yet in almost every other country (large and small) the telephone system is government-operated. Are they all lucky? Don't they realize that they are supposed to be less efficient?

The last point to be made on this subject is that Government managers cannot possibly be less capable than managers in the private sector because they are the SAME PEOPLE. To believe that they change their stripes as they move in and out of Government is not rational. One Cabinet member who resigned in early 1968 said that he found his bureaucracy much less rigid and more amendable to change than any university and most large corporations with which he was familiar. Close examination of the backgrounds of top Government managers will indicate that many have been suc-

cessful businessmen. Conversely, close examination of the backgrounds of successful businessmen will indicate that many have had extensive Government or military experience or exposure.

A Plea for Understanding

At no time has this article argued that the Postal Service is operating at maximum efficiency or maximum effectiveness. The list of "little" and "no" control that begins this discussion obviously means that inefficiencies exist. The proposal to convert the Post Office Department into a *public* corporation was made by Postmaster General Lawrence F. O'Brien to correct some of the inefficiencies. President Johnson thought that the idea was of such importance that he appointed a blue-ribbon Commission to study the organization of the Postal Service. The Commission was chaired by Frederick R. Kappel, former Chairman of American Telephone & Telegraph Co. and had these members:

GEORGE P. BAKER

(Dean of Harvard's Graduate School of Business Administration)

DAVID E. BELL

(Vice president in charge of international programs for the Ford Foundation)

FRED J. BORCH

(President of General Electric Co.)

RALPH LAZARUS

(Chairman of the Board of Federated Department Stores)

GEORGE MEANY

(President of the American Federation of Labor)

J. IRWIN MILLER

(Chairman of the Boards of Cummins Engine Co., Inc. and Irwin-Union Bank and Trust Co., Columbus, Ind., as well as of the Union Starch and Refining Co., Granite City, Ill.)

WILLIAM BEVERLY MURPHY

(President of Campbell Soup Co.)

RUDOLPH A. PETERSON

(President of the Bank of America and National Trust and Savings Association)

DAVID GINSBURG

(Noted Washington attorney)

Their report substantiates the statement that the existing poorly coordinated, politically managed, system causes the inefficiencies, not the men who manage the Postal Service. The report is commended to your reading. It is entitled *Toward Postal Excellence, the Report of the President's Commission on Postal Organization*, June 1968.

President Nixon and his staff studied all aspects of

the various recommendations. He directed Postmaster General Blount to draft legislation. On May 27, 1969, legislation was submitted to the House of Representatives. The bill is quite lengthy. The following are some of its essential recommendations:

- An Executive Council to act much as a board of directors in a private business;
- A Postmaster General and Deputy Postmaster General selected by the Council to serve at their pleasure;
- Bonding authority for investment capital;
- Collective bargaining for wages and conditions of service;
- An independent rate commission to develop rate packages for approval by the Council (congressional veto provided);
- More control over transportation rates and schedules;
- More control over appointment of management and supervisory personnel;
- Removal of partisan party politics from all aspects of managing the Postal Service.

I have been associated with postal reform since the gleam-in-the-eye stage in 1966. Recognition of the inadequacies of the existing system for managing the Postal Service provided the motivation for two Presidents (of different political parties), two Postmasters General (of different political parties), a distinguished presidential Commission and many others, to develop a most innovative and precedent-setting solution. It is not a one-man idea, nor a one-party idea. Total postal reorganization is an idea whose time has come.

The Postal Service is more "visible" than any other department in the executive branch. Almost every American comes in contact with it in some way every day. Additionally, each day the Postal Service sets in motion almost every one of its more than 730,000 individuals, all of its 78,000 vehicles, all of its machines, and all of its capability in actual real world situations to handle and deliver 285 million pieces of a product to 60 million locations, regardless to geography, across this continent, Alaska, and Hawaii. No other Government department and no private business can honestly make that statement. The Defense Department, for example, also is highly visible, but all of us would hope that its *total* capabilities are never tested in a real world environment.

The Post Office Department does not recoil from criticism. Some very fine suggestions have been made by people outside of the Department. All constructive criticism is welcome. Neither is this article intended to be in derogation of the telephone system, easily the most effective in the world, and the best bargain in America next to a 6-cent stamp. The plea made here is that, when you desire to criticize the Department or compare it with some other entity that ye KNOW YE WHAT YE JUDGE! □

A Business Approach to—

TECHNOLOGICAL INNOVATION IN THE SEVENTIES

DESPITE MUCH recent publicity, there are still too few people in Government service, private industry, and the academic world who understand deeply what technological innovation is all about, much less how to harness it to improve the quality of our lives.

Toward a Greater Appreciation

Technological innovation is the cutting edge of our Nation's economic growth and its national security. Although this has been true for decades, it has only been widely recognized as such in recent years. The publicity accorded Government projects ranging from the first atomic bomb through the development of nuclear submarines and space exploration has helped make vast numbers of our citizens aware of the key role technology plays in our Nation's defense posture. The role of technological innovation in commercial successes such as Xerox, Texas Instruments, and Polaroid and consequently in their effects on our Nation's economy is much less widely understood and appreciated. Nevertheless, until very recently, there has been no widespread public questioning



"Perhaps we should consider not only redefining and redirecting the major missions of some of our governmental bodies, but also restructuring some of our Federal organizations in order to increase the probabilities of successful innovation in those areas to which we have assigned highest priorities."

By **DR. CHARLES S. SHOUP, Jr.**

*Director, Corporate Research
Cabot Corporation*

of the desirability for industry to seek to grow and prosper via technological innovation.

Today, we are involved in a wide-ranging dialog regarding the intrinsic benefits of technology to our society. Vocal concern about the quality of our environment, the risks of nuclear war, and poverty in our Nation often focuses attention on the failures of technology to solve specific social problems and on those problems which have been created by misuse of technology. Even so, there are very few of those involved in this dialog who fail to recognize the positive contributions technology has made to our lives, although it is currently popular to deplore the affluence which technology has helped create.

The dichotomy revealed in these debates has today increased the amount of superficial attention being given to technology. It should also serve as a warning to us of the necessity for having a more thorough understanding of all facets of technological innovation in order that we may use technology wisely in pursuing our national goals with minimum undesirable side effects.

When Invention Becomes Innovation

In any discussion of technological innovation, it is important to establish the distinction between innovation and invention. A piece of technology can be created—invented—and even patented, yet remain in the inventor's notebook with no impact whatsoever on society. Only when that invention is utilized in such a way as to have an economic impact on society is it termed an innovation. Thus, an innovation may be an invention that is put to use to improve the performance of an existing product, perhaps creating new demand for that product; or it may be a new process for making an existing product or for performing a known service at a lower cost. Occasionally an innovation may lead to completely new families of products and even to completely new businesses.

One measure of the impact attributable to an innovation is its effect on the gross national product. This measurement permits us to compare a new type of packaged food (e.g., freeze-dried coffee) with a new concept applied to the most complex weapon system (e.g., large scale integrated circuits).

Technological innovations have been a major factor in the sustained economic growth our Nation has enjoyed over the years. By the same token, our defense posture has relied on technological innovations for the successful deployment of most of its key systems during this same period of time. In many respects technological competition among private companies is similar to competition among Nations. It is the safe and prudent assumption that the most vigorous and successful competitors are

aggressively seeking "new and improved products" which is the most powerful stimulus to technological innovation within the individual company.

Given the role which technological innovation plays in national economic growth and security, it is clearly in our national interest to obtain a sound understanding of the anatomy of the technological innovation process. This interest is underscored by the realization that true, noninflationary economic growth is necessary in order to create the wherewithal to finance the high priority social programs which we have identified as necessary to improve the quality of life in this Nation.

Motivating Creativity

The vast majority of technological innovations are evolutionary in nature, commercialized by technology-oriented organizations which engage in sustained research and development in order to provide a steady output of new and improved products and services. For these companies, as for the Nation as a whole, economic growth flowing from such evolutionary innovations is dependent both on the quality of their research and development effort and the success of their attempts to commercialize new ideas once the innovative opportunities have been identified.

Thus, just as "innovation" is not the same as "invention," neither can it be described precisely as "research and development." Organized R. & D. activity provides the knowledge and experience from which inventions flow and through which they can be further developed into practical forms. The efficiency of the chain, R. & D.→invention→innovation, depends to a larger degree than is often admitted on management's ability to motivate their most creative people in directions in which the results of their creativity are most likely to be needed, and therefore put to use.

Despite the concentration of research and development efforts in a relatively small number of very large organizations, a disproportionate number of the most significant technological innovations has been due to the inventive capabilities of very small companies or lone inventors working with relatively little R. & D. investment.

Robert Goddard and Chester Carlsen are synonymous with rockets and xerography. Edwin Land's Polaroid camera, Leo Baekeland's Bakelite and Samuel Ruben's mercury battery have made major impacts on our economy during the past few decades. The beginnings of the semiconductor industry, which has made significant simultaneous contributions to our national security and the economy, were concentrated in a myriad of relatively small companies. Some of these firms, such as Texas Instruments, Fairchild and Signetics, have

now grown quite large. The story of the proliferation of small electronics companies around Boston has been told many times. These successful companies provide convincing evidence that the environment for technological innovation in small organizations must be different from that which exists in the large ones.

In recent years many large corporations, recognizing these differences, have begun to experiment with new organizational structures in an attempt to capture most of the environmental advantages of both the small and large company with a minimum of the disadvantages inherent in each. This restructuring has come about in part due to the realization in industrial circles that the traditional routes to business growth through technological innovation would not suffice for the requirements of the seventies. Indeed, the traditional routes have been recognized as being incompatible in some cases with the very missions for which they were originally formed.

As the demands for innovative solutions to a broad range of society's problems increase more rapidly than the financial resources available for allocation, we, as a nation, can learn something from the restructuring efforts being made to accelerate innovation in private industry. Perhaps we should consider not only redefining and redirecting the major missions of some of our governmental bodies, but also restructuring some of our Federal organizations in order to increase the probabilities of successful innovation in those areas to which we have assigned highest priorities.

The Influence of Organizational Size

Three years ago the U.S. Department of Commerce's panel on invention and innovation issued a highly readable report on the subject of innovation in industry, including several recommendations for governmental action.¹ This report dwelt at length on some of the environmental differences between large and small organizations which affect innovative performance. In order to set the stage for discussing current attempts to create organizational spurs to innovation, let us briefly review a few of these differences.

Most large organizations are designed to maintain the status quo and to allow for growth through evolutionary processes. The protection of the present operation and the security of the present managers is the prime *raison d'être*. The highest levels of management in the organization are seldom personally dedicated to innovation nor are they often willing to accommodate the risks inherent in change. This lack of an adventure-some spirit tends to permeate the entire hierarchy. Even compensation systems within large organizations tend to work against innovation. Employees typically

see rewards going primarily to men without failures to blemish their records, while those who have dared to be different, but without success, are passed over. The reward/risk relationship in most large organizations inhibits rather than stimulates innovation.

Within the large organization a radical idea often has no ready-made home. Very few companies have had effective mechanisms for evaluating ideas brought into them from the outside—good implementation of these ideas has been even rarer. Research and development departments typically have been established to do science and engineering rather than to create new businesses or commercialize inventions. The fantastic obstacle course of venture analysis, documentation, periodic justifications, monthly progress reports, and management reviews often discourages an innovator in a large organization.

Small Firms More Risk-Oriented

A large company's policies and procedures are based on the orderly progression of its current operations. An innovative new venture which requires financial support for success must compete with the financial needs of the rest of the company. This is one of the major stumbling blocks to successful innovation in a large company.

In such a company the management of investment risks is considered a part of the normal routine. Therefore, alternatives tend to be appraised not only in terms of potential rewards, but in terms of the risks relative to those rewards, considering the limited resources available to the company for investing in its existing businesses, as well as new areas.

A company manufacturing widgets has an excellent understanding of the widget market and of the probable return on its investment should it build a new widget plant. The risks involved in the manufacture of a completely new nonwidget product, perhaps one that hasn't even been fully developed and whose costs are therefore highly uncertain, are much less well understood than the risks of investing in more widget manufacturing capacity. An innovative project that carries a high risk must necessarily promise a significantly higher return than the same dollar invested in an established and well understood business in order to compete successfully for funds within the large company.

Probably the single most important reason why a disproportionate number of the most dramatic innovations have originated within small companies is because large companies tend to invest in lower "for sure" profits with low risks instead of "might be" high-potential ventures with high risks. On the other hand, a small innovative company founded by an entrepreneur committed to a single idea seldom has the opportunity to indulge itself in the luxury of considering "sure

¹ "Technological Innovation: Its Environment and Management," U.S. Department of Commerce, U.S. Government Printing Office, Washington, D.C., 1967.

things" with small returns against the ultimate success of the venture to which it has already committed itself. The management of an established successful corporation doesn't have to play "You Bet Your Company," but every young entrepreneurial company does just that.

This brings us to the role of the entrepreneur in innovation. Virtually all studies of the innovation process have pointed out the crucial importance of the technical innovator, the entrepreneur, who is committed to an idea which he believes should not be allowed to die, one which he is determined to push through to commercial success one way or the other.

The Entrepreneurial Instinct

The entrepreneur is the catalyst of the innovation process. Typically he is the inventor, although he may instead be the champion of someone else's idea. Usually, he is technically oriented with a high need for achievement and recognition. Within a large organization he is likely to attack traditional corporate "wisdom" and to ignore the social and organizational amenities in the process. He may have annoyed management in the past with some of his ideas and by his aggressiveness. His enthusiasm and frustration over the slow pace of the corporate response is often interpreted in a negative manner by his peers—particularly those just above him in the organization. Management may tend to be turned off by what appears to be his abrasive personality. Members of management who have been annoyed by him in the past may tend to turn his aggressiveness against him, providing a route for revenge and nay-saying. Given this type of atmosphere, it is not surprising that entrepreneurs buffeted by years of frustrations and lack of understanding within large organizations often choose to form their own companies.

To do so, of course, requires courage and deep conviction that his idea can be made to work. Starting in the proverbial garage with a couple of friends, the entrepreneur has staked his career as well as the security of his family on his convictions. The entrepreneur has no alternative to success, for failure of his venture carries with it the probability of personal bankruptcy as well as the knowledge that he will have let down his close associates and those who have invested in him. A failure cannot be buried in an annual report as can the failure of a small venture within a larger organization. The entrepreneur, moreover, is often blind to the possibility of failure. He is motivated by the need to succeed, by the desire to obtain recognition for his achievement and in the back of his mind by the promise of large financial rewards. But only with the small company which he has founded does he surely have the freedom to run his own show and to prove himself without the constraints of bureaucratic controls.

Recently top managements in an increasing number of large organizations have begun to understand better

the anatomy of the innovation process and have made organizational adjustments to capitalize on their new understanding. In many cases investment centers have been established apart from the normal organizational framework bearing names such as New Ventures Division or New Enterprise Department. These centers are often under the direction of a new breed of manager—a manager of innovation—a man with entrepreneurial instincts who understands the innovation process and the needs of entrepreneurs. The purpose of these novel organizational forms is to create new and profitable entrepreneurial ventures under the auspices of the large corporation by exploiting the entrepreneurial capabilities already residing within the company to stimulate rather than inhibit technological innovation.

Elements of a Conducive Environment

The organizational structures which have been established for this purpose vary considerably in form and style but the successful ones all have two elements in common: A firm and enthusiastic commitment derived from a thorough understanding of the entire innovation process on the part of the corporation's highest level of management and a close and excellent working relationship between that management and the management of the innovation center itself. Both elements are necessary for success due to the extended time and the high degree of flexibility required to create a viable new business outside the day-to-day interests of the corporation.

The small entrepreneurial company has the advantage of flexibility, the capability of altering directions quickly to meet the ever-changing needs of the market, and the drive, determination, and dedication of the free-wheeling entrepreneur to make a success of the venture. The large company has established financial resources and functional staff expertise to which an isolated entrepreneur seldom has access. The combination of these desirable attributes to provide a successful mechanism for innovation outside the normal constraints of a mature business is the justification for the establishment of an innovation center.

To make this concept successful in practice, it is often necessary to relieve the innovation center of some of the restrictions imposed on the existing businesses by corporate policies and procedures. Personnel policies, purchasing procedures and staffing practices must not be required to coincide with those of the parent organization, although they certainly should not be forced to be different. The style of an innovation center is often highly personal and decentralized, particularly as new ventures reach the point of commercialization. The climate is, by design, one that encourages individual initiative and achievement, that stimulates idea men to stick their necks out without fear of ridicule, and that provides a mechanism for innovation regardless of

whether the source of the idea or invention is the company's laboratories or an outside inventor.

The key people in an innovation center must have a high degree of market awareness. The organization must be largely enterprise oriented, rather than function oriented. A highly developed detailed plan pinpointing perceived uncertainties and describing goals quantitatively in magnitude and time is a useful prerequisite to the launching of each new technological venture from the innovation center, even though that business plan is certain to be wrong in detail.

But all the formal new organizational techniques and management information systems cannot substitute for sound management judgment. It takes this rare commodity to be able to provide the leadership with the appropriate flexibility and optimal sense of timing to be used in venture analyses, to have the courage to admit mistakes and write off poor ventures as quickly as possible, but not prematurely. There is no substitute for the sound judgment that can provide the proper balance between the entrepreneur's needs for flexibility and freedom of action and judicious financial control.

By thus establishing innovation centers or venture groups, many successful mature organizations believe they now have more efficient mechanisms than ever before to shepherd innovations all the way from the laboratory to the marketplace. This is likely to result in an increasing proportion of innovative new technological ventures being launched with the backing of large companies. Hopefully these new management approaches will accelerate successful technological innovations aimed at some of the Nation's critical social needs which have recently achieved a high degree of visibility.

Market Plays Key Role

Of course, technology is not the limiting factor in the solution to all the social problems to which our Nation has assigned high priorities. In some cases, technical solutions are already available and the need for action is obvious. But a need, no matter how critical, is not the same as a market.

That private industry can respond promptly and efficiently when sufficiently motivated by market potential has been amply demonstrated during the past several decades of our Nation's economic history. But constructive industrial response to pressing social needs is still considerably slower at the present time than it would be if the needs were manifested in the form of a conventional market.

It thus seems clear that to harness most efficiently the immense capabilities of the Nation's large technologically competent companies to meet society's most important needs will require the creation of identifiable markets to serve those needs. Where conventional markets exist today in response to some of our social de-

mands, such as the elimination of air and water pollution and the improvement of mass transit systems, they are often so fragmented and diverse in their requirements as to make it impractical for even the largest corporations to devote the resources necessary to address them adequately.

Ultimately of course, these critical demands that society is making of us will lead to the development of quasi-conventional markets for which private enterprises will be able to create and distribute the products and services most in demand. But some of these pressing social demands have reached such an acute stage that the time required for the normal development of supplier-customer relationships may be longer than society is willing to endure. Hence, the vociferous demands for vague and undefined Government action to solve specified problems such as poverty in the ghetto and maldistribution of employment opportunities.

In view of the recently enhanced innovative capabilities of many mature technological companies, the rapid creation of quasi-conventional markets to serve the most critical social needs of today should be a high priority domestic objective for the Federal Government. The widespread recognition of a market created in response to each of these needs should be sufficient in itself to provide the stimulus necessary for private industry to assume a sense of urgency and direction to achieve some of our national goals at a much more rapid pace than would otherwise be likely. A more diffuse understanding of the entire innovation process should increase the probabilities for generating and implementing the creative ideas necessary for a successful and rapid creation of such markets. Elements within the Federal Government might themselves adopt some of the new techniques currently being used by a few private companies and experiment with new organizational and behavioral concepts in order to catalyze the transformation of some of our social demands into viable markets. If successful, such action should help restore the confidence of our youth in our Government, our economic system, and in our Nation's role as a world leader. □

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MILITARY SCIENTISTS OF YORE



HISTORY shows that a majority of the outstanding scientists in the early days spent a major portion of their talents in solving military problems. Among these were Archimedes, daVinci, Galileo, and Rumford.

Key examples of items which our present way of life owes to the military scientists are:

- Uniforms of loose woolen cloth replaced felt (to give more protection against cold weather).
- The double boiler was invented to save money in cooking Army food.
- Potato soup for which the Germans are so famous today was invented for military use.
- Canned food was invented in response to a request by Napoleon for a better means of feeding his troops.
- The calculus of variations in mathematics was developed to help solve ballistic problems for the artilleryman.

In the more recent days, the modern computer owes much to the Army and radar came out of World War II (the basic patent is held by an Army officer). Then, of course, there is the new item which has per-

mitted canned draft beer, namely, a filter sufficiently fine to eliminate the spores from the beer, thus stopping spoilage.

The entire science of meteorology was put on a scientific rather than a folklore basis as a result of a requirement given the Royal Scientific Academy by the King of France after a disastrous storm sunk the major ships of his Navy off Balaklava in the Crimea war.



Archimedes was an outstanding military scientist. If you look through various historical comments on his activities you will find that he devised many ingenious war machines. In fact, in the protection of the city of Syracuse, whenever a new device would appear at the wall

to counter an attack, the attacking troupes would break and run, utterly demoralized by his schemes. For the part of the city wall that was on the coast, the attack was made from boats. He threw over hooks on pulley systems and capstands which grabbed the boats and dashed them to pieces on the rocky shore.

A careful look at a majority of Archimedes' inventions shows that these were clever applications of science to military tactics. An exception is the statement that he used large mirrors to set the sails of the attacking ships on fire. I had always been concerned about this because many people used this to prove that even Archimedes could slip. However, in my occasional reading about him, I discovered he was extremely competent as an experimenter as well as a theoretician. Let us examine this on the basis

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of known data and ancillary information on military tactics.

Briefly, the facts are that Archimedes used a large mirror for some purpose and the sails were set on fire. The common technique of that day to set fire to sails of enemy ships was to shoot arrows with burning rags attached. These arrows were caught in the rigging and thus created a fire. Since this is a simple and effective way to burn sails on enemy ships, for what logical purpose could the mirrors really have been used?

In order to attack a wall, it is necessary to get close enough to launch the weapon. If the helmsman could be momentarily blinded when traveling close to the rocks at the base of the wall, the ship may crash and be destroyed. I know of no more effective way to blind a man than flash the sun in his eyes with a mirror. That is my interpretation of Archimedes' use of large mirrors in war. No wonder the soldiers killed Archimedes when Syracuse was finally captured by treachery.

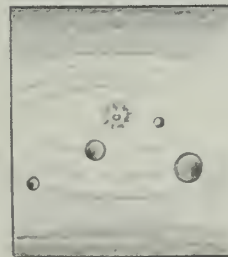


In looking through many of the histories of astronomy, I feel that Tycho Brahe has been dismissed with a casual treatment. Tycho Brahe lived in the time when there was a great discussion as to whether the sun moved around the earth or whether the earth moved around the sun.

The astronomers' observation of that time proved sufficiently that the planets moved around the sun and the moon moved around the earth. The paths were approximately circular within an improvement being made by adding an epicycle of a small diameter compared to the circle. The center of the epicycle called the "deferent" moved uniformly around the circle path centered at the sun while the planet moved uniformly around the circle path

of the orbiting epicycle.. This accounted quite well for all the known observations. Mathematically, there is no difference in computing the locations of the planets of the solar system as to whether the earth moves around the sun or the sun moves around the earth. This is verified by the accuracy with which the ancient people were able to predict new moons and eclipses.

Astronomers have difficulty adjusting the planets. Therefore, in lieu of experiments they make observations. Tycho Brahe devised the best naked eye observatory that has ever been made. Since it was well-known by astronomers of that time that the stars in the heavens were at different distances from the earth, Tycho Brahe decided to measure to see if the earth or the sun was the point that stood still in the solar system. This he did by measuring the parallax of the nearest stars relative to the most distant stars. If he found a parallax—the earth was moving around the sun; if no parallax was found—the earth was stationary. His measurements, which were good to the order of a second of arc, determine that there was no parallax. Therefore, the earth was still.



Kepler is known today for his three laws of planetary motion. However, I would like to point out that his initial discovery which brought him prominence is what I call his Zeroth law of the planets, since it does precede the others.

To Kepler and all the astronomers who preceded him, the known planets not counting the Earth, were Mercury, Venus, Mars, Jupiter, and Saturn. Since Kepler had accepted the Copernican system with a stationary sun, the five classical planets and the earth made six which moved around the sun.

Now there exist only five regular solids and no more. With Tycho's data available, Kepler proceeded to resolve the question whether additional planets existed and discovered a law which explained the spacing of the planets. He used a so-called "nesting" process to prove the theory of his Zeroth law: If one passes spheres through each of the six planets and then places a different one of the regular solids between these spheres in the proper sequence, one obtained the spacing of the planets. Each regular solid is circumscribed about one sphere and inscribed in the next. The sequence is Mercury, Octahedron; Venus, Isosahedron; Earth, Dodecahedron; Mars, Tetrahedron; Jupiter, Hexahedron (or cube); and Saturn. Thus, we see that since there are no more regular solids, that there can be no more planets. Also, since every sphere is centered on the sun, the sun is stationary.

This discovery by Kepler made him quite famous. Then, because of the troubled times and religious persecutions, he went to apprentice with Tycho and fell heir to Tycho's precise observations.

In analyzing Tycho's data and comparing it with his Zeroth law, Kepler was amazed to find discrepancies and eventually discovered some discrepancies as large as eight minutes of arc. So he abandoned the Zeroth law.

Today, we think of Kepler because of his famous three laws of planetary motion. The first law is that the line joining the planet to the sun sweeps out equal areas in equal times; the second law, the planets travel in ellipses with the sun at a focus; the third law, the squares of the periods of the planets are proportional as cubes of their major axes. In terms of modern mechanics, the first law states that a central force is involved, the second that the force is proportional to the inverse square, and the third that the acceleration is independent of the mass of the planet concerned, or that the mass of the planets is negligible compared to the sun.

* * * * *



Galileo, among his many actions, proceeded to measure the speed of light. He had a very ingenious experiment. He trained one of his servants to be very effective in covering and uncovering a lantern with a cloth.

One dark night he proceeded outside the city where he lived and climbed up one mountain while his servant climbed up the other. After a few experimental tries to insure that they were well-warmed up and could rapidly obtain a long enough interval to measure the time by his pulse, several round trip passes of the light were made. The instant the light on the other hill went out he uncovered his lantern and immediately covered it again.

I have not yet found the value he obtained, but assume 1 mile separation, it would be in the order of 5 to 10 miles per second. Now what is wrong with this experiment? Many people will say that specifically the time in uncovering the lantern makes the experiment wrong. I disagree.

Now I will tell you another experiment. Our college physics courses told of placing an electrical bell under a glass jar and evaluating the system. This experiment was first performed by Robert Boyle using a watch as the noise source. As the air is removed from the chamber, the sound becomes weaker and weaker until finally no sound is heard. The conclusion of the test, as the teacher states, is that this proves that sound does not travel in a vacuum.

I have looked into Boyle's original work as closely as I am able and discovered that Boyle's conclusion was that sound does not pass from the watch to the observer's ear under these conditions. Many people may think there is no difference between the two conclusions.

Again, I disagree. The modern interpretation is wrong but Boyle is right.

I have performed experiments in which one pound of TNT was placed 50 miles above the earth's surface and have detected sound on the surface at one dyne per square centimeter. Thus we receive the sound which originated in a much higher vacuum than Boyle used.

The real explanation of these phenomena is that less sound gets from the source to the reduced atmosphere in the bell jar and from the reduced atmosphere in the bell jar to the jar itself, but there is no attenuation of the sound while traveling in the partial vacuum. In both of these cases the transfer is proportional to the pressure of the air. Thus, at one-half atmosphere pressure we should obtain one-half times one-half or one-fourth of the sound to the ear and at one hundredth atmosphere we obtain one ten thousandth of the sound without any attenuation in the partial vacuum.

Not too long after I had developed these arguments, to bolster a sound grenade experiment on a rocket I was undertaking, Dr. Bruce Lindsey of Brown University presented a paper at the American Physical Society reporting measurements of this which verified my analysis.

These two last experiments, that of Galileo and Boyle, suffer from the same problem. Boyle, however, was content to state a valid hypothesis. In both cases the experiment did not isolate the end effects and measure them. Galileo should have tried the experiment using two different distances between his lanterns. If he had done so, he would have discovered that the speed of light is proportional to the distance it travels. For the sound in vacuum case, one should use two different path lengths in vacuum and show that the longer the path length the greater the absorption.

That is why the experiments of Galileo as he per-

formed it and the modern interpretation of Boyle's experiments are bad experiments. In my opinion, the quality of an experiment depends on whether it gives you a protection against a misinterpretation of unsuspected phenomena rather than verification of a hypothesis. It is more important to observe an unexpected phenomena than to assume that you have proved a well-known fact when indeed you have been measuring a spurious item.



There is a numerical method of solving an algebraic equation known as Horner's method in the English speaking countries. It is called Tartula's method in Southern Europe. However, thanks to the monumental tomes produced by Needham entitled "Science and Civilization in

China;" we know this method was first utilized in China.

Needham gives a typical example of a problem from a Chinese mathbook of the 11th century A.D.

A military commander approaches a city and notices that if he lines up a well on the east road with the city wall it is also in line with a tree on the north road. Now I must explain that the classical Chinese city contains a circular well which is located at the crossing of a north-south road and an east-west road. The commander queries a farmer and discovers the well is 1 mile west and the tree is 3 miles north of the city wall, what is the diameter of the city?

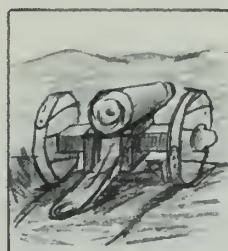
This is a very simple problem. It comes out to be a fourth degree equation in the radius of the city. Try to solve that without a computer!

Of course, it is solved by Horner's method as 8.2 miles.

Many mathematicians have said that the Chinese would have trouble solving equations of these types because they had no zero. However, they used a grid structure and number markers to perform their calculations. When no marker was placed in the box, the value was zero; when the value was negative, the

markers were placed diagonally or red markers were used instead of black. By the 14th century, in using an extension of this method, they were solving fourth degree equations with four unknowns with all cross products.

There is an interesting reference in the 11th century text mentioned above which quotes verbatim a seventh century Chinese math book and shows a diagram of what we call Paschall's triangle. The table is entitled the "Ancient Classical Method of Determining the Binominal Coefficients."



There was a major battle on the Yangtze River in 1130 wherein gunpowder weapons played a major role. The battle was extended after dark by burning high piles of straw.

In the Boer war, an isolated force besieging a stockade had plenty of gunpowder but had lost their cannon. They made a wooden gun with staves and metal hoops and breached the stockade.

I picked up a book entitled "Treatise on Ordnance and Armor" by Alexander Holley, dated 1865, and found some very interesting comments. The use of hoops and of materials of different elastic properties to improve strength of guns was well known in those days. An appendix to this volume has intrigued me. Entitled "How Guns Burst" by Norman Wiard, Esq. He has some interesting comments as to why the large guns of those days burst. He found that the major type of fracture was common among the Army Columbiad gun, the Navy Dahlgren gun, and the Parrott gun, and occurred whether the gun be made of steel or cast iron. He proceeds to give several paragraphs of analysis in explanation of this phenomena. Some of which are quite intriguing and may even be enlightening today. His conclusion which I commend for your consideration follows: "It is evident that the model is best in which the direction of the fracture is least uniform but a properly constructed gun should not burst at all." □

For out of olde felde, as men seith,
Cometh al this newe corn fro yere to yere;
And out of olde bokes, in good feith,
Cometh al this newe science that men lere.

—CHAUCER
The Parlement of Foules

BREAKING THE BUREAUCRATIC PROGRESS BARRIER

*"A common failing in the whole area of management by objectives * * * is to quantify what is easy to quantify: set objectives in the easy areas and forget the rest. This is a formula for disaster."*

By Dr. Robert J. Massey
President, Progress Management Services

THIS PAPER is on change in bureaucracy.¹ It presents an approach to altering the basic nature of an organization so that dynamic change for the better, i.e., "progress," becomes as natural to the modified bureaucracy as resistance to change is to the normal one.

It is traditional in a paper of this sort to begin with an argument to justify why progress is now "required." In seeking to accomplish that function—explaining why what was "good enough" in the past is not good enough now—authors often disparage the contributions of those heroes of the past who got us as far as we are.

This paper violates the tradition of attempting to justify the need for progress by proving that "something is wrong." Instead, this paper is based squarely on these premises:

- It is an inherent obligation of public servants to strive to maximize the public benefits achieved through use of the public resources subject to their discretion.
- A corollary of the obligation to strive for maximum current efficiency is the public servant's obligation to strive to improve his organization as an ever more effective instrument of its mission functions.
- Further improvement in the mission effectiveness of the organization is always possible.

The question of whether or not increased efficiency is "really needed" is totally improper. The bureaucrat has an inherent obligation to constantly seek out possibilities for improvement. Of course, only those improvements should be developed and implemented which will pay for themselves in an appropriate amount of time.

PROCESS OF BUREAUCRATIC PROGRESS

Organizational progress may be defined in terms of the rate of advance through a flux of problems barring attainment of improved mission performance capability.

¹ The term "bureaucracy" is used in the technical sense as denoting a formal organization of some duration.

The Concept of the "Problem"

The term "problem" denotes the gap between present performance and a performance capability objective. For the organization, a problem is how to move from being as good as it is, to being as good as it aspires to be.

A problem can come into being either by deterioration of performance, i.e., "the car won't start," or by a raising of the performance aspiration level. It is this latter kind, the "progress problem," that is the prerequisite to progress. Since progress problems are brought into being through a conscious decision to set a performance objective above the current level, they can exist in unlimited numbers. The important considerations in determining the numbers of problems available at any one time is the intensity of the desire for progress, and the number needed to achieve that rate of improvement.

The Anatomy of Organizational Progress

Just as a year's gross sales for a department store is the sum of its individual sales, an organization's progress for a year is the sum of its individual "progress events." A "progress event" is the solution of an individual progress problem.

For a progress event to occur, it is necessary to have: (1) a progress problem, identified and sufficiently defined to be solvable (a distinction is necessary between a "problem" and a "symptom" of a problem); (2) the existence of means—technique, technical approach—capable of solving the problem; (3) "coupling" of the problem and solution, that is recognition by the problem-solver that the problem can be solved by the solution approach; and (4) actual implementation of the approach to solve the problem.

Figure 1 is a conceptual model of the process of progress. It says that progress in a bureaucracy is directly related to (1) the supply of problems—prog-

ress opportunities—which have been recognized and defined, (2) the availability of approaches for the solution of such problems, (3) the ability to search the storehouse of available solutions to identify those which are capable of solving the problem, and (4) the ability to follow through with whatever development, testing, and demonstration is required to actually solve the problems.

The Pacing Factor in Bureaucratic Progress

It is a major contention of this paper that in seeking to influence the rate of progress in a bureaucracy, that the leverage lies in working on the generation of problems and to a lesser extent on activities directed toward identification of solutions for such problems. Relatively little is to be gained (and perhaps considerable frustra-



tion generated) by working on the supply of solutions within the organization, for example by sending eager young bureaucrats to conferences and courses. In other words, if it is calves you are interested in, you will be well advised to invest in more heifers, rather than in more bulls.

It is a common assumption, almost always unstated, that the rate of improvement in an organization is a function of the availability of means for such improvement, i.e., of "supply" of solutions. While this idea seems unchallengeable on logical grounds (see discussion in opening paragraphs of this paper) it is psychologically naive. The pacing factor in bureaucratic progress is "demand" for progress, not the supply of the means. As March and Simon put it, "the individual or organization does not search for or consider alternatives to the present course of action unless that present course of action is in some sense 'unsatisfactory'."² Further, the level of performance the organization accepts as "satisfactory" tends over time to approximate the average performance achieved.

Thus it follows that to induce an aggressive search for excellence within a bureaucracy, it is necessary to gain control of the standard by which performance is judged. This standard of performance must then be set so there is an appropriate gap between standard performance and what is customarily achieved, i.e., raise the "progress voltage."

RAISING THE ORGANIZATION'S PROGRESS VOLTAGE

Raising the general level of the organization's aspirations for progress—"progress voltage"—is not particularly difficult. It does not involve radical innovation, merely application of a "proven solution" borrowed from other areas of organizational performance. That solution is to go about it the way the organization gets any other job done:

- Assign responsibility;
- Measure actual achievement against requirements;
- Enforce accountability.

These measures would institutionalize the function of "organizational R. & D." a function critical to the future vitality of an organization, but one which is scarcely recognized in most bureaucracies.

The Organizational R. & D. Function

The concept of organizational R. & D. is an important but unfamiliar one. It is simply application of the

R. & D. process to the upgrading of the organization as an instrument for the accomplishment of its mission.

As used here, "R. & D." encompasses both the establishment of requirements—specifications, objectives—for levels of performance not before achieved, and the planning and carrying through of the actions required to fulfill those requirements.

The concept of "organization" in "organizational R. & D." encompasses *all* the means which affect the organization's ability to do its job. It includes such tangible resources as buildings, machines, libraries, and people with their skills, and intangible "resources" such as the attitudes of people and the organization's "image" which affects its ability to attract new members.

The organizational R. & D. function calls for never-ending striving to improve the organization as the instrument of its mission. Grasping this function is not made easier by the fact that a major aspect of the function involves the continuous rethinking of the mission itself of determining what products or services the organization should provide to what clients or customers in what time frame.

Responsibility for Organizational R. & D.

Who should be responsible for the continuing R. & D. of the organization as a "machine" for accomplishing its evolving mission? *The people who are the organization!* This responsibility should be recognized as an inherent aspect of the duties of all citizens of the organization, both managers and rank-and-file. The top man must conceive his duties as including those of "project manager" for the R. & D. of the entire organization. He must lead the effort to visualize the best the organization might become, negotiate the "system specifications" with appropriate higher officials, and identify and solve the problems through which the organization can fulfill its collective aspiration for excellence.

Subordinate officials must conceive themselves as "project managers" for their subsystems of the overall organizational system. This subsystem, or the "manager's system," encompasses all the interacting elements which influence his ability to accomplish the day-to-day results for which he is responsible. The manager's system will include some elements under his direct control, but many more for which "configuration management control" lies elsewhere in the organization, or perhaps in interfacing organizations or aspects of the environment.

Effective performance of organizational R. & D. responsibilities demands that the manager acquire a knowledge in depth of his system. He must know the nature of the inputs and outputs of his system and how to measure them. He must understand the processes and interrelationships through which his system converts his inputs into his outputs. He must

² James G. March and Herbert A. Simon, *Organizations* (Wiley & Sons, 1958), p. 173. March and Simon's analysis of the process of bureaucratic progress, as set forth in Chapter 7, "Planning and Innovation in Organizations," is highly recommended.

know and be able to define the constraints or "barriers" which stand in the way of improving his system. In particular, he must know the system parameter, or parameters, where change will have the highest-leverage impact on the overall performance of his system. Further, he must identify and define specific problems through whose solution the performance in high-leverage system functions can be improved. Finally, he must solve those systems problems he can solve without additional resources or authority, and take steps to bring other problems to the attention of appropriate authority. For all this he must be held accountable in a way as real as a manager in industry is held accountable for profit performance, or a captain in the Navy for keeping his ship off the rocks.³

PROBLEMS, THEIR PRODUCTION AND USE

Levying organizational R. & D. responsibilities on individuals within the organization, who are held accountable for results, establishes a precondition for the identifying and defining of problems (heifers) which when coupled with the right solutions (bulls) will result in innovative events (calves) which collectively constitute dynamic organizational progress.

The problems involved in these innovative events are "bitesized" micro-problems. While "cleaning up the Potomac," or "finding, classifying and sinking submarines" are problems, they are not solvable, directly in their totality. To solve them, these macro-problems must be broken into solvable micro-problems. Here is the way Herbert Simon describes the problem-solving process.

Problem solving proceeds by erecting goals, detecting differences between present situation and goal, finding in memory or by search tools or processes that are relevant to reducing differences of these particular kinds, and applying these tools or processes. Each problem generates subproblems until we find a subproblem we can solve—for which we already have a program stored in memory. We proceed until, by successive solution of such subproblems, we eventually achieve our overall goal—or give up.⁴

³ Some critics may hold that this is all very naive since the skills of a journeyman systems analyst would be required to carry out these responsibilities, while organizations are generally manned by ordinary mortals. Nuts! If ordinary people work at trying to understand the system in which they work day in and day out, particularly if *all* the brains in the organization are harnessed to the task, they can gain a far deeper understanding (in the time they could devote to it) than could an outside systems analyst consultant (in the time he could devote). Further, the people who are the organization can develop simple models to help increase understanding and provide a means for a first evaluation of proposed system changes.

⁴ Herbert A. Simon, *The New Science of Management Decision* (Harper & Row, 1960), p. 27.

Thus the key to the "problem" of transforming the organization from what it actually is to what it potentially can be is the identification and definition of discrete and delimited subproblems of that macro-problem. This can be accomplished through resolving the macro-problem into its constituent top-level problems, resolving those into subproblems, etc., to as low a level as is required to yield problems which are directly solvable.

The basic division of labor within an organization provides the framework for the first level of problem breakout. Each manager's general responsibility must then be broken into a number of specific progress objectives.

To identify and define specific and solvable problems, the manager must analyze his own top-level objectives into a structure of subobjectives. Specific problems will then relate to the attainment of specific and relatively detailed subobjectives.

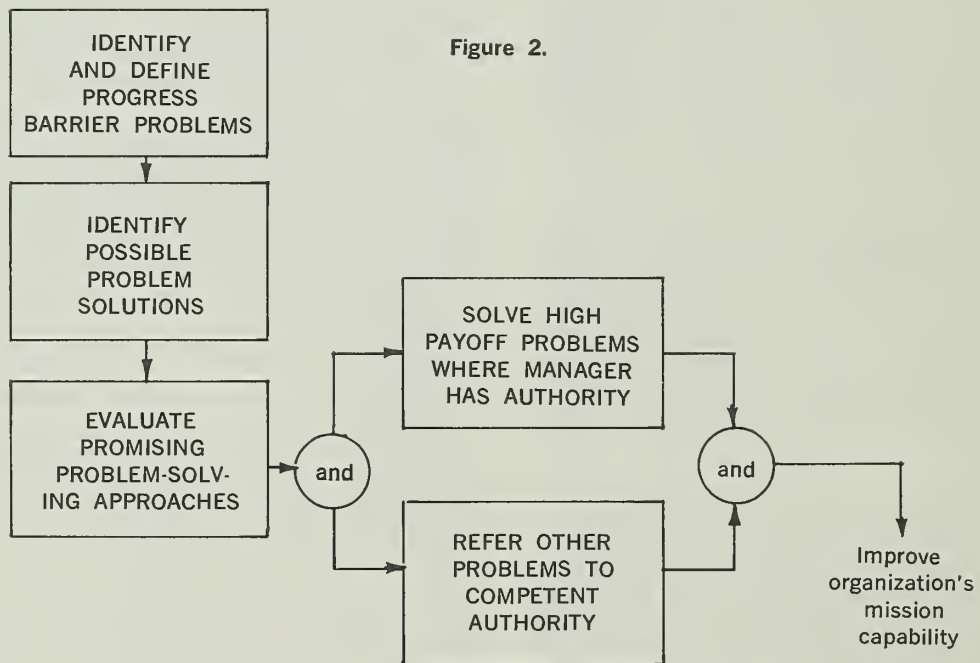
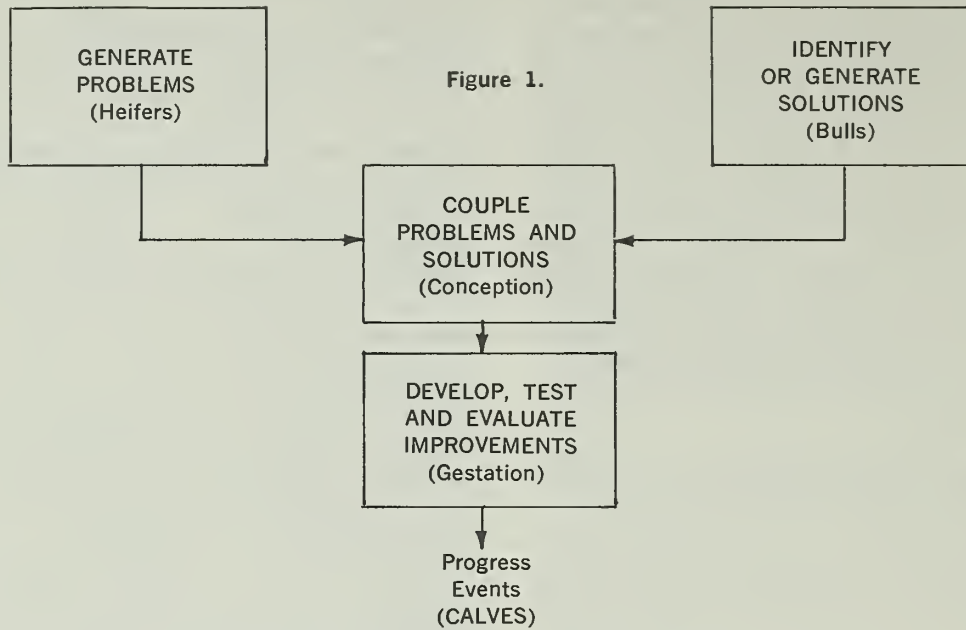
The identification and definition of problems is relatively simple—assuming the manager really understands his system. In effect, the definition of a problem involves the identification of specific subobjectives with particularly high-leverage impact on one of the manager's progress objectives.

The definition of a problem consists mainly of (1) the objective, (2) the current level of performance, and (3) constraints imposed on the solution. In addition, it is often desirable to show explicitly how solution of the problem will contribute to a higher-level objective of obvious practical utility.

Problems should be stated rigorously in terms of output, i.e., the resulting situation which would constitute solution of the problem. By stating the objective in terms of "performance specifications," the widest range of alternative solution approaches become possible. Most garden variety "problems" violate this rule. More often than not, what is represented as a "problem" is really a "solution," i.e., a pet program someone wants to put into effect. In such "problems," the state of things which constitutes solution, and how it contributes to higher purposes, are usually implied rather than made explicit.

A key factor in setting progress objectives, and defining problems based on them, is the ability to measure performance. The "yardstick problem" is an extremely difficult and important one. It can never be totally solved—reliable, objective, simple means to measure every variable important to system performance. However, worthwhile progress can be made by defining yardstick requirements and working to meet them.

A common failing in the whole area of management by objectives—this paper is on management of the organizational self-renewal function "by objectives"—is to quantify what is easy to quantify: Set objectives in the easy areas and forget the rest. This is a formula



for disaster. Generally speaking, particularly in a knowledge-oriented organization, the more important the factor, the more difficult it is to measure. For example consider this objective for a Defense inhouse laboratory:

To develop and maintain a structure of incentives such that what is good for individual staff members is perceived as, and in fact is, good for his laboratory, his Service, and the Department of Defense.

While it is desirable to be able to measure performance in relation to objectives quantitatively, the lack of adequate yardsticks need be no bar to management of progress through use of objectives.⁵

If a problem has been identified and adequately defined, the identification of a number of attractive solution approaches is normally not particularly difficult. The central element of the process of "coupling" the problem to solutions involves exposure of the problem to minds containing "solution" knowledge.

The search for solutions may be a multistage sequence where the source consulted may merely identify a potential technical approach and a source of more detailed information. With a well-defined problem, such a search will normally converge quite rapidly on "the expert" on the problem.

The search for problem solutions can be greatly facilitated by documenting the problem on a one page "problem resume" to permit its circulation as a "want ad" for information on means for its solution. A "Problem Résumé" on a technological problem related to an advanced technological objective can help. The function of the problem résumé is to facilitate establishment of person-to-person dialog between the individual with the problem and the individual with knowledge of a solution approach.

The final stage in the "problem management" process involves the "D.T. & E." (Development, Test, and Evaluation) and/or implementation of improvements. Here it is maintained that many, and perhaps most, of the "improvement opportunities" identified *should not* be further developed or implemented (The term "improvement opportunity" is used to denote a problem together with information on one or more promising approaches for its solution.) Probably only the "cream" of the improvement opportunities made available to the organization through the processes described above should be implemented, i.e., those which offer a very high return on the cost and disruption involved in implementation. Stability is important to the smooth and efficient operation of an organization. Stability should not be lightly sacrificed through promiscuous tinkering.

⁵ A method of enforcing accountability for progress responsibilities for which adequate measures of performance are not available is described in "Molding Organization Climate," *Advanced Management*, October 1961 by Robert J. Massey and Waino W. Suojanen.

Of that subset of improvement opportunities which merit implementation, the responsible manager will be able to implement some on his own authority. Others must be brought to the attention of the people with authority to take the necessary implementing action.

The manager's problem management responsibilities in organizational R&D are depicted graphically in Figure 2.

SUMMARY

The normal state of a bureaucracy is stability, unless the organization is subjected to external shocks which cause a consensus that "something has to be done." under those circumstances, the organization "comes in heat"—briefly—and innovations are sought and implemented.

It is argued in this paper that it is possible to build into the organization incentives and institutional arrangements through which it will be "in heat" all the time and will "naturally" be innovative, self-renewing, and excellence-seeking.

A stability-seeking normal bureaucracy can be converted into an excellence-seeking organization through measures which will increase the "demand" for progress and result in the identification and definition of specific problems whose solution would collectively constitute progress.

Progress demand can be internally generated by institutionalizing the "organizational R. & D." function. Each responsible manager and every team in the organization must be made explicitly responsible, and *held accountable*, for continuing improvement of their subsystem of the organization. These responsibilities must be spelled out in terms of progress objectives, expressed where possible in terms of measurable performance to be achieved by specified dates. Managers must be held accountable for identifying and defining discrete problems whose solution would make attainment of their progress objectives possible; for solving high-payoff problems within their own authority, and for bringing to the attention of appropriate officials problems for which they lack the authority or resources for their solution. □

ABOUT THE AUTHOR

As a naval officer Dr. Massey became fascinated with the problems of progress in bureaucracies. This interest led to formal academic study and research and involvement in Defense R&D. On leaving the Navy in 1964, he completed work for his Ph.D. in Public Administration (American University, 1967) and established Progress Management Services in January 1968.

ZERO

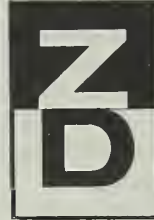
THERE IS a continuing need for programs to maintain the highest possible standards of quality, reliability, and performance. This need has been dramatized again and again in press releases regarding consumer dissatisfaction with a wide range of products and services, in government inspection and failure reports, and in the increasing number of actions being taken by industry to correct deficiencies in products already sold.

Question the Status Quo

We might well ask what is the cause of these well documented and publicized defects? My answer is management. Many of us have contributed to these errors by not making an all-out frontal attack on some of the classical management doctrines still being practiced. Managers must spotlight the need for a realistic appraisal of our policies and management techniques which may have been necessary and right at one time, but are obsolete in today's fast changing world.

For example, during World War II when American industry was forced to increase the size of their organizations, develop new production line techniques, and train thousands of new employees, we relied heavily on management engineers or systems analysts to predetermine the tasks to be performed and then carefully programed these tasks to insure minimal time, cost, and effort. These management techniques worked well and they enabled us to develop new standards of performance leading to a higher level of production than any nation in the history of the world. However, this was war. Everyone was personally involved and our motivation to do the best possible job, regardless of the task assigned, was clearly related to survival.

After the war, American industry regrouped and converted plants to take advantage of the many technological and scientific breakthroughs stemming from the war. We had achieved a position of world leadership in the engineering, production, and distribution proc-



"From a personal standpoint, the teachers helped point out faults, error was constantly being investigated, and others sometimes get assistance, and Congress in pointing out shortcomings or business that could not have pro-

esses and this know-how served us well in developing world markets for our products and staying ahead in the field of military hardware. Business was good and management tended to relax and rely on the proven policies and procedures responsible for this relatively high level of prosperity and affluence. Then, in the fifties our Nation began to take notice of the inroads foreign industry was making on our commercial markets and of their success in military, aerospace, and other scientific areas. This competition for world leadership developed into what was commonly referred to as the cold war.

Our international prestige was being seriously threatened and we were amazed to find that we were behind in several scientific fields, not the least of which was the space program. Scientific and technological breakthroughs were occurring at an ever-increasing pace and improvements in almost every field of endeavor resulted in changes rendering old methods obsolete.

Traditional Management was Impersonal

These changes dictated an ever-increasing degree of specialization, automation, and adjustment in order to mass produce the highly complex and sophisticated products of today's world. Further, the more we advanced the state of the arts, the more demanding the specifications, the greater the need to improve the quality and reliability of our products. Management recognized this need by increasing the emphasis on quality control, inspection, and operational testing. These measures were effective, but they caused production delays and high costs due to rework; and they only directed attention to an isolated fault in procedures, inferior material or an individual worker's

By Lt. Gen. EARL C. HEDLUND, USAF
Director, Defense Supply Agency

DEFECTS

*...ing with my school days where
to my years as a flyer where pilot
ed—to today's climate where DSA
rom the General Accounting Office
mings, I know of no organization
d from zero defects."*



carelessness. We were starting this corrective action at the end of the production line and each such action normally sought the solution of a specific problem and did not go beyond the cause of the individual action. This was not good enough; it represented the carrot and stick theory of management and our quality prob-



The author discusses ZD benefits with one of the 1,500 prime contractors participating in the program. An estimated 20,000 subcontractors and vendors also participate.

lems began to compound themselves every time we updated our capabilities.

Obviously these actions at best only represented stop-gap measures and some of our more farsighted managers began to review their management procedures and their application to the entire organizational structure. They found that those in less responsible jobs were rebelling against this stepped-up tempo of change and automation. Many saw themselves a mere number in the organizational structure, in danger of being replaced by machines or becoming a slave to a system which gave them little or no freedom in how to best perform their tasks. This lack of recognition and sense of belonging was further influenced by the employee's inability to identify with the end product, because in most instances, they were but one of many contributors in the production process. They never saw many of their coworkers or their end products. This lack of employee motivation, sense of accomplishment and pride in the organization's products resulted in the development of a new theory of participatory management. Simply stated, this theory is based on the principle that decisions are likely to be better, and to be implemented better, if those responsible for the implementation are allowed to participate in making them.

ZD is a Participatory Program

Under the participatory approach, the employee is given an area of freedom in determining how to best perform his tasks and the management support he needs to use this freedom effectively. Each level of management is asked to share its knowledge, skill, and experience with their subordinates and, conversely, let the subordinates take part in the decisionmaking process. In so doing, the subordinate can augment his own capabilities, and in turn pass this on to his subordinates—right down to each individual worker.

Management was seeking the voluntary involvement and participation of each employee and a number of programs and techniques were developed to make sure each employee was given an opportunity to participate in determining the character of his tasks and responsi-

Adapted from remarks at The American Society for Zero Defects Third Annual National Symposium, Anaheim, Calif., April 6, 1970.

bilities. One of the most notable was the Zero Defects program which was developed and used so successfully by the aerospace industry.

It is a fundamental characteristic of the aerospace industry to try to outstrip its prior efforts. This comes not only from the constant pressure of competition within this relatively new industry, but from the external competition (or threat) from those countries whose interests are hostile to ours. Continued growth, technological breakthroughs, and improved standards of quality, are an absolute necessity to the success of these aerospace programs. In many instances, design inventiveness was so rapid and operational experience was so limited that the outside limits of tolerance were difficult to establish and the costs of failure were so great that they literally could not afford to have one—for example, our Apollo program. Management, therefore, had to seek every possible means of assuring maximum awareness of the necessity of doing the job right the first time and building in a quality and reliability as near to 100 percent as possible. Management needed everyone's help in understanding and developing solutions to their potential problems before they had a chance to develop.

There was no time to wait for inspections or tests to reveal malfunctions or errors if the stringent and demanding schedules and performance levels were to be met.

We (and here I mean the whole defense industry/aerospace team) needed everyone's help in whipping our quality problems. When Martin Marietta initiated its Zero Defects program back in 1961, this provided the impetus for getting everyone on the quality team. The program was an immediate success at Martin and spread so quickly that in a matter of months many other aerospace firms adopted the program. The main idea was to place the responsibility for quality in its rightful place—with the people doing the job, that is, with the people most knowledgeable of their individual tasks and in the best position to effect the changes necessary to insure that the job is done right the first time.

This recognition of the importance of the individual's contribution to not only his job but to the whole effort, the final product (or in our aerospace efforts—to mission accomplishment), cannot be overemphasized. Somehow we must continue this emphasis on helping find ways for each individual to equate his contribution to the end product so that improvement in performance comes naturally and easily. We must encourage everyone to use his brain and exercise imagination in the performance of his tasks. We must get people to be more observant so if one pair of eyes makes a mistake another pair will not agree without looking. We must get people to use their common sense, initiative, and know-how in bringing their problems to management instead of waiting for management to initiate the corrective action.

Four Factors for Success

It's not better theory that we need. This has been spelled out in all of our modern management and leadership textbooks and courses. I would imagine that every executive has studied and discussed the principles of good management. However, this is not enough. We have got to act, we have to develop a system giving everyone a piece of the action, and be judged by what we do—not by what we say. Zero Defects is just such an action program but management must be convinced of the need for improvements; management must establish the proper climate and administrative procedures; and management must be willing to sustain the program.

It is the policy of the Defense Department to adopt ZD programs in-house and to encourage their adoption by industry if ZD serves industry's interest. It is not, however, the policy of the DOD to demand that industry establish ZD programs. The DOD instruction which established the DOD Zero Defects program reads as follows:

"Defense contractors, on a voluntary basis, shall be encouraged to establish and maintain Zero Defects type programs as a mutual benefit to contractors and the Government at no additional cost to the DOD."

With respect to the DOD in-house activities, the DOD instruction provides the following:

"Zero Defects programs shall be established, within available resources, in DOD "in-house" activities responsible for production, maintenance, and storage of materiel, and in such other activities where Zero Defects programs can be effectively used."

In accordance with this policy, ZD programs—many very energetic and successful—have been adopted throughout industry, the military services, and in the Defense Supply Agency. In general, these programs have worked out well and have served the interest of both the DOD and industry. From a personal standpoint, starting with my school days where the teachers helped point out faults—to my years as a flyer where pilot error was constantly being investigated—to today's climate where DSA and others sometimes get assistance from the General Accounting Office and Congress in pointing out shortcomings, I know of no organization of business that could not have profited from Zero Defects.

Keep in mind, however, that Zero Defects is not an end in itself and no group of ZD experts or practitioners can long sustain a program that is not integrated into the mainstream of line management. It must have top management's support and be made a regular part of each supervisor's daily routine.

I do not care what you call it, Zero Defects, Pride, VIP, Care, PQ, or something that really swings like Hana Pookela (that's the Hawaiian name for superior craftsmanship) no motivation or employee participa-

tion program can long exist as a sideshow outside the mainstream of our management process.

I think we would all agree that the success of a ZD program depends on four factors:

- Management direction and full support;
- Intensive detailed planning and training;
- Measurement of progress against goals that the employees have had a part in establishing and which mean something to them;
- Establishment of procedures by which all employees can identify problem areas and submit recommendations for product improvement with the knowledge that these recommendations are being sought, considered, and used by all levels of management.

Of these I would attach prime importance to the first and last. If the boss is not in on the action and if the employees cannot really make their voices heard, then ZD is meaningless. It is interesting to note that the general theme of ZD, particularly the error cause removal feature, is similar in philosophy to the concept of participatory management being pushed in the Defense Department by Secretary Laird and Mr. Packard. Mr. Laird recognized the need for enlightened management attitudes, improved communications, and individual recognition when he said:

"In big organizations, it is easy for the individual to become a cog in an impersonal machine. It is easy to become so bemused by the organization chart or the computer or the weapons system or the cost-effective calculus that one forgets about the human being by whom and for whom these things are produced and used.

"It is easy to slip into an inflexible bureaucratic routine without ever pausing to see the deadening impact of this routine on initiative, innovation, and leadership. It is easy to centralize the power to make decisions and the power to spur action at the top of a large organization and, in the process, to stifle the bright idea and the restless energy of people down the line."

Observation, Imagination and Perception

I am convinced that there are a lot of good ideas stemming from observant workers, foremen, and managers. We urgently need to promote the generation and communication of these ideas. In fact, some of our greatest ideas stemmed from imaginative people who were able to perceive the significance of what they were seeing.

- Penicillin was discovered when a piece of green mold accidentally drifted in through Alexander Fleming's laboratory window and destroyed some bacteria he was growing in a petri dish.
- Alexander Graham Bell worked for months to make a hearing aid for his wife and discovered the principles of the telephone.
- Clarence Birdseye watched Eskimos pull fish from the water. The fish were soon frozen. Adaptation of this idea led to the Birdseye Frozen Food Business.
- A broken arm motivated Charles Kettering to develop

the self-starter for automobiles. (I've done this myself on a model T Ford.)

- When a train wreck delayed his journey, George Westinghouse began to think about the value of an air brake.
- Thomas Edison adapted the principle of the motion picture camera from a mechanical toy.
- Benjamin Franklin cut the lenses of two pairs of eye glasses and made bifocals because he was tired of carrying two pairs of glasses.

While our ZD results may not be as dramatic, our observation has been that there have been many significant payoffs in terms of increased efficiency, lower costs, and reduced expenses. For instance:

- One company reported an approximate 40-percent reduction in defects over a 2-year period, with estimated savings of \$2 million.
- In an aerospace plant, where performance improvement and estimated cost avoidance are computed by comparing current quality performance with the quality performance during the first month that each department participated in the program, estimated annual cost avoidances amounting to over \$7 million were reported during the past 2 years.
- Another company, in only 1 year, was able to reduce a 100-percent inspection tear-down of aircraft engines to one tear-down in 30 engines.
- A drug manufacturer reported they have a classification of defects considered minor and nonessential but still objectionable to the customer. It might involve a slightly smudged label, or a scratched carton. Before the program, these harmless defects were running at a rate of around 1 percent. Within a year they were reduced to a quarter of that, and they are currently running at one-tenth of 1 percent.
- A bearing manufacturer reported a reduction of 60 percent in his scrap expenses and a 20-percent increase in production while using the same equipment and with no change in employment levels.

These are but a few examples of the cost effectiveness of Zero Defects programs. My staff advises me that figures available from contractors with ZD programs reveal that for every dollar spent on ZD, they have averaged a return of \$12, and that this excludes intangible benefits derived from the program.

ZD Helps Quality Assurance

Although DSA is not designed to produce a profit for stockholders, we are keenly conscious of costs in our operations. Last year we obligated over \$5 billion and administered 238,000 contracts for the military services and defense agencies with a value of \$54.7 billion. Insuring a quality product, according to specification and schedule, is still one of our biggest challenges.

Recently, my staff and I met with the logistic chiefs of each of the services, and their staffs. Although many logistics subjects were discussed at these conferences, one concern emerged loud and clear from all of these meetings. That concern was the need to place greater emphasis on controlling quality and reliability in our military procurements.

Our contract administration services people have been devoting a lot of time and effort to selling contractors the concept that good quality practices save money and enhance their competitive position. We are stressing to our plant representatives and contractors the need for effective contractor inspection systems and quality control programs and the need to sell Zero Defects.

DSA is applying substantial resources to insure the quality of the products procured for DOD and NASA. About 40 percent of our contract administration work force is committed to quality assurance. We utilize about 9,000 of our people and expend almost \$100 million a year in these efforts at some 22,000 plants. I think much of this could be avoided if our contractors used ZD to augment and improve their quality assurance program.

DSA recognizes the benefits of ZD and have, along with other defense activities, initiated a viable, driving program. We have extended the program into every element of our organization and have encouraged all of our contractors to establish similar programs. We record tangible results through a quarterly reporting system which features:

- Identification of the causes of errors.
- The establishment of goals.
- Supervisor and employee training.
- Recognition and award for results.

Our system regularly indicates that we are reducing errors, we *are* improving performance and we *are* obtaining the thoughtful participation of our employees at every level. For example, during the first half of fiscal year 1970, DSA employees have submitted over 3,200 error cause identification suggestions, 2,000 of which were adopted. We have set over 1,500 motivating performance goals at our activities and to date have achieved almost half of these. Official recognition was given to over 2,000 of our employees for their contribution to the program.

In-House Results Outstanding

Specific examples of DOD in-house activity savings are almost as dramatic as those reported by our contractors. For example:

- After initiation of a ZD program at a naval shipyard, welding shop workers turned out error-free welding on 48,751 linear feet of section butts of a nuclear submarine. This is equal to 9.23 miles of welding without a defect—a significant quality achievement!

This accomplishment will save the Navy approximately \$205,000 of total ship cost on the submarine.

- At an Air Force operational base, reduction in jet engine test cell reject rates from 15 to 7 percent were achieved after initiation of a Zero Defects program.
- One Army arsenal reduced scrap and rework in ordnance items with the result in validated savings of \$318,000 in a year.
- A DSA supply center reported an error cause identification and removal action which resulted in the procurement of zinc-coated steel door hinges in place of the nickelplated brass hinges previously purchased with resulted in fiscal year 1969 savings of \$208,800.

We now have about 1,500 prime contractors participating in the program and an estimate of some 20,000 subcontractors and vendors. This level of participation by cost conscious businessmen who are in a highly competitive market is clear evidence of the benefits they are receiving from the program.

Awards for Participation and Achievement

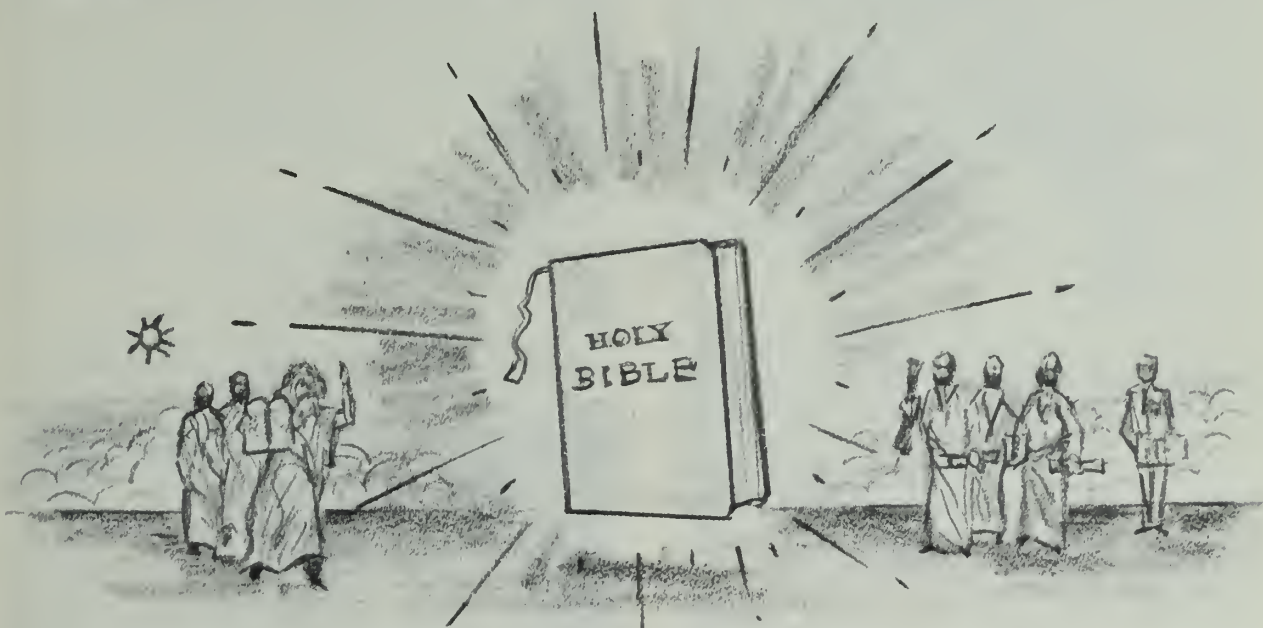
On the contractor award side of the ledger, DSA has processed and approved over 1,200 participation awards for presentation to our prime contractors. Eligibility for the participation award requires the accomplishment of several program milestones such as management support, 85 percent employee participation, goal setting, error cause identification and error cause removal suggestions, vendor participation, and a recognition program. In addition, over 360 achievement awards, the second highest award available, have been presented. This award requires 90 percent employee participation and higher levels in all of the other criteria. Finally, almost 50 craftsmanship awards, the highest award available, have been presented since the inception of the Defense program. The majority of these have been to aircraft and aerospace contractors who were among the first to recognize the merit of the ZD effort.

In Conclusion—

The greatest danger to management thinking in this age of specialization is obsolescence. Improvement is accelerating everywhere at such a rate that we need a planned program to meet the threat of obsolescence. Professor Schell from MIT used an analogy which I believe sums it up quite well, he said:

We must ride the waves of change. A skilled practitioner takes his surfboard out from the shallows as far as 2 miles from shore. When an incoming wave reaches a certain point, he mounts the board ahead of the wave and rides his way into the beach, a 2-mile jaunt. He doesn't change the wave; he doesn't alter it; he doesn't fight it. He capitalizes on it."

REMEMBER—The surfboard rider is ahead of the wave, not behind it. □



BIBLICAL PRECEDENT FOR MODERN MANAGEMENT

IT IS GENERALLY recognized among writers on modern management theory that there are some eight different definitions of what management actually is and what it encompasses. These eight schools of thought allege that management is: A process; empirical in nature; a social system; a manifestation of human relations; a scientific phenomenon; a system operation; a mathematical process; and an application of decisionmaking.

Without going into detail on the respective merits of each contention, it is of interest to note, especially for clergymen, that the Holy Bible preceded the whole lot in promulgating and presenting some insights into management theory and the organizational process. Specifically, scriptures deal with the idea that management is a process—that it consists of a series of functions which can be enumerated through the use of mnemonics, i.e., POSDCORB—planning, organizing, staffing, directing, controlling, reporting and budgeting. Of course, there are plentiful examples of the other schools manifest in Biblical literature as well, but we shall limit our discussion to that found in the Book of Exodus, Chapter XVIII.

Holy Writ relates that Jethro, the priest of Midian, the father-in-law of Moses, hearing of the miraculous

events which have befallen the people of Israel, during and after the exodus from Egyptian bondage, journeys to the Israelite camp accompanied by Zipporah, his daughter and his two grandsons, Gershom and Eliezer. After the amenities of welcome, Jethro settles in for a short visit and observes, among other things, the managerial skill of his famous son-in-law. He is surprised and disturbed by what he sees. After watching an endless line of people queuing up to wait for Moses to judge their individual cases, problems and complaints, Jethro can bear it no longer.

“What is this thing that thou doest to the people? Why sittest thou thyself alone, and all the people stand about thee from morning unto even?” (Exodus XVIII, v. 14-1)

In other words, “This is poor management, Moses.” Thus does Jethro rebuke his son-in-law.

In today's vernacular he must have said the following: “What you have to do is to realize that management

By Chaplain (Major) ALLAN M. BLUSTEIN
U.S. Army

is a process consisting of certain functions. If you fail to execute the most important of them, then you certainly cannot expect an efficient operation here as you lead these people out of the wilderness to the Promised Land. That most important function of all is planning—without it, you'll be in the wilderness forever. Therefore, I strongly advise you to employ not only planning but the rest of the functions in the mnemonic—POSDCORB, and the sooner the better.

"Firstly, you must plan to delegate your duties, remembering that management is not doing but rather, getting others to do.

"Secondly, you should bear in mind that efficiency is the difference between what is accomplished and what ought to be accomplished. If you do accept this definition, then you will appoint subordinates who will be able to handle more cases than you possibly could, on a far more individualized basis, in a more effective manner. In short, what you will be doing is putting the 'personal' into personnel management where it rightfully belongs. In this way, you'll be organizing your operation here for maximum effectiveness.

"The third function, staffing, is inherent in the organizing you have just done by appointing these men of truth, hating unjust gain, to be rulers of thousands, of hundreds, of fifties, and of tens.

"Fourthly, with proper direction on your part, these middle managers can then do their jobs more effectively as well, they in turn directing their subordinates in a similar manner.

"Fifthly, you will see that with the proper institution of these functions, you'll be able to do so because of the many reports they will submit, which will permit you to keep tabs on the pulse of the operation.

"And lastly, I think you can see that if you budget your time, resources, and abilities in a methodical and precise way, the result will be a well-coordinated process as you try to lead this stiff-necked nation to better things.

"Have I made myself clear, son-in-law?"

It is fairly obvious that even if he did not convey the message precisely in these terms, Jethro did succeed in getting it across to Moses. Hence, we read further of Jethro saying, "If thou shalt do this thing, and God command thee so, then thou shalt be able to endure, and all the people also shall go to their place in peace." (ibid, v. 23)

Jethro's last admonishment seems to indicate a leaning to a decentralization of the total operation. "People going to their place in peace," implies a relaxation of centralized control and a strengthening of local administrative procedures. Apparently even in Jethro's times, controversy raged about decentralization of community control. What was it that King Solomon said about nothing being new under the sun?

Finally, in all fairness, it must be said that Holy

Writ is replete with episodes and situations which exemplify the several schools of management theory. Some of the more striking ones come readily to mind. Noah and the animals certainly typify the theories of mathematical process (he had to count them) and the social system as well as decisionmaking. Furthermore, one can be reasonably certain that some problems in human relations developed on that overcrowded ark.

Other notable examples of human relations management can be discerned in the narrative involving Abraham and the Sodom and Gomorrah incident. Abraham's grandson Jacob had much difficulty with his 12 sons because of his poor managerial skills. Resentment, jealousy, and other evils could possibly have been averted by Jacob had he exercised stronger decision-making resolve. His son Joseph accomplished a massive management coup in planning and administering the 7-year programs during the periods of plenty and the periods of famine. Of necessity, he had to employ and utilize the concept of POSDCORB, i.e., that management is a process.

It is well to note that elements of any or all the schools of management thought were present in these examples and that no situation can be classified exclusively as an example of one school only. True management generally employs a combination of ingredients to get the job done.

Perhaps the greatest management task of Biblical Times involved leading a bedraggled mass of humanity, over 600,000 strong, through vicissitudes ranging from constant hostile attacks to unending complaints and grumbling about this or that. Indeed, in view of the overall job Moses accomplished with these ex-slaves, Jethro should have been a little more lenient with him. After all, nobody is perfect!

One can go on and on through the Bible citing cases where management or the lack of it played a significant role. Suffice it to say that clergymen, by virtue of their calling and the very nature of their work, should and must be effective managers, not only of things but of the people who need and want their help. And a clergyman is perhaps more fortunate than the average student of management who must glean his wisdom from manmade texts, inasmuch as the clergyman has these plus an ever greater advantage in that his inspiration stems from a Divinely made text. Let us emulate the example of one of the greatest managers of all time indeed, even as he listened to his father-in-law. The Book of Proverbs says it most succinctly.

"He that refuseth correction despiseth his own soul;

"But he that hearkeneth to reproof getteth understanding." *Proverbs 15:32* □.

About People Here and There—



PEDIATRIC WARD MAKES CHANGES



Major Gwendolyn Donnelly, Army Nurse Corps, Fort Leonard Wood, illustrates the differences between the cumbersome oxygen cylinder (under her left hand) used to provide pressure to the croupette (in crib) and the small compressor (under her right hand) which does the same job for less money. Major Donnelly works in the pediatric ward at the General Leonard Wood Army Hospital.

Four small arrivals in baby blue at the pediatric ward of the General Leonard Wood Army Hospital are relieving the pressure there. Small compressors (painted blue) have replaced the large, unsightly oxygen tanks used to operate croupettes.

Croupettes control the environment for children with upper respiratory infections. The croupettes are operated by compressed oxygen and control the air flow, relative humidity, temperature, and aerosol medications for the patient under the canopy.

Three 1,650 gallon oxygen cylinders were used to provide the pressure required to operate one croupette continuously for 24 hours.

Maj. Gwendolyn Donnelly, Army Nurse Corps, Fort Leonard Wood, suggested substituting air compressors for the oxygen tanks. Since oxygen was not the primary need in most cases, she found that the compressors would operate the croupette as efficiently as the oxygen cylinders at a reduced cost.

Based on an average consumption of 20 oxygen tanks per week to operate the croupettes, over 1,000 cylinders were needed annually in the pediatric ward. Since a cylinder refill costs about \$4, the croupettes cost nearly \$4,000 a year to run.

The four Dia-pumps purchased to replace the oxygen cylinder system are operated electrically. The compressor provides a constant flow of air from the room to the croupette. The desired level of humidity, temperature, and aerosol medications are controlled by croupette adjustments.

Major Donnelly's suggestion to use the air compressors reduces the number of man-hours required to mind the croupettes, eliminates the special handling of the large, cumbersome cylinders, and removes the safety hazards of the pressurized flammable oxygen in addition to the \$3,386 savings yearly.

CLEANER AND CHEAPER

Soiled linen travels cut rate to the laundry these days at the Air Force Systems Command's Wilford Hall USAF Medical Center, Brooks AFB, Tex.—which, translated, simply means that laundry bags now are plastic instead of canvas.

The canvas bag had to be laundered after each use. Frequent washings wore them out and generated a high replacement rate. The plastic aircraft trash bag (8105-848-9631) is a standard supply item.

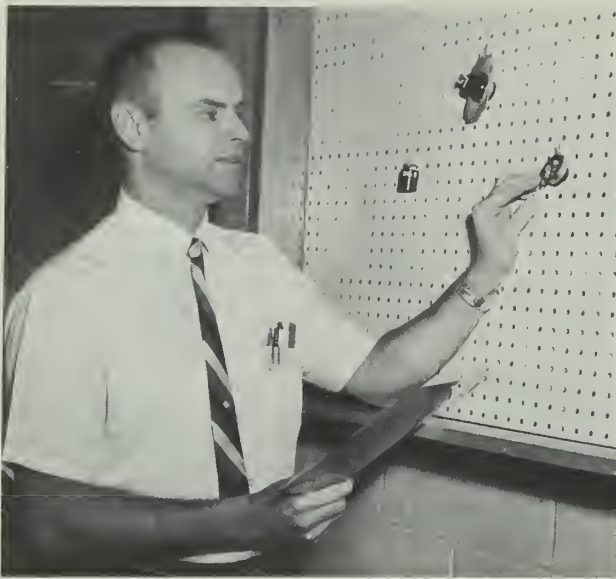
Rita L. Lewis of the Center suggested the substitution which is saving \$5,064 annually.

CONNECTS WITH CONNECTORS

Defense Electronics Supply Center (DESC) Dayton, Ohio, and the Air Force collaborated on a salvage project which netted savings of \$9,956 in reclaimed electronic parts.

The Center is a field activity of the Defense Supply Agency.

The collaboration began when Kelly Air Force Base,



Howard Culbertson inspects connector assembly (top) and reclaimed plugs and receptacles which saved DESC \$9,956.

Tex., notified the Center that it was considering the disposal of a number of connector assemblies which contained individual parts managed by the Center.

Howard Culbertson, a DESC technician, discussed the situation with an Air Force official and discovered that plugs and receptacles contained in the assemblies could be used under existing Federal stock numbers. He therefore initiated action to have the excess assemblies shipped to the Center and also made arrangements to have the parts disassembled, inspected, packaged and placed in active stock under their appropriate FSN's.

Mr. Culbertson's efforts, which required the coordinated efforts of three DESC directorates, resulted in over 9,000 connector plugs and receptacles placed in stock and a procurement cost of \$9,956 avoided.

BUILT BUSHINGS SPARE GEARS

Approximately 60 percent of all transmissions in tractors of a certain make, when turned in for repair to the U.S. Army Equipment Support Center, Mannheim, Germany, were found unserviceable because second-gear bushings were worn excessively. Otherwise, the gears remained serviceable. Since separate bushings were not available through supply channels, the serviceable gears could not be reused by simply exchanging unserviceable bushings for new bushings. Gears had to be replaced at a cost of \$118.65 each.

To eliminate this expense and to decrease deadline time, the Equipment Support Center decided to try building second-gear bushings in-house. The attempt was successful. The cost of fabricating each bushing amounts to only \$7.97. This represents a cost savings

of \$110.68 for each tractor transmission repaired. The 82 transmissions repaired or programmed for repair in this manner will result in an annual savings of \$9,075.76.

THROWS NEW LIGHT ON SUBJECT

Charlie V. Roark of the Defense General Supply Center in Richmond, Va., believes in letting the light shine through.

The Center is a field activity of the Defense Supply Agency.

A value engineering technician, Mr. Roark compared two fluorescent lamps procured by the Center. He found that not only was one lamp 17 percent more efficient and cost 3 cents less than the other but it was also more readily available from industry. On a buy of 167,095 fluorescent lamps, that 3 cents represented big money.

The next four procurements of fluorescent lamps resulted in savings of \$23,056 during the current fiscal year.

COORDINATES WHIRLYBIRD PIX

Booking a photographer on regularly scheduled helicopter flights instead of setting up special aerial photography flights saved the 4th Aviation Detachment, U.S. Army, Japan, \$2,700 in fiscal year 1970.

The 4th had been averaging four to five helicopter flights per month for aerial photographs until MSG James T. Hendrick observed that flights for other purposes were scheduled each week to the majority of Army installations in the Kanto Plains area. So he suggested that an information copy of work orders for aerial photography be furnished to the Aviation Detachment. As a result, the photography is now handled concurrently with other missions.

In addition to dollar savings, Hendrick's idea has freed helicopters for other essential missions.



MSG James T. Hendrick

RECEIVES HIGH MARK FOR MARKING



Specialist 6 Jimmy R. McGee shows Lieutenant Colonel James Genova, Chief of the Dental Clinic, that using a felt-tipped pen for marking on the X-ray film was easier, faster and less expensive than the previous method of using a special radio opaque tape.

OPENS DOOR FOR DAMMED UP INVENTORY

Limiting the number of items in the Federal Supply Catalog, according to Irving Saul of the Defense Industrial Supply Center, Philadelphia, Pa., is just the opposite of stemming the flood by holding a finger in the dike. Instead, Saul says, "You have to look for places to drill holes to let out the overflow."

When Saul found there were 102 butt hinges listed in the catalog, his technical intuition told him this would be a good place to try to drill a hole. The Defense Industrial Supply Center equipment specialist, whose efforts are principally devoted to item reduction, found a way to reduce the 102 items to 34.

His study of the hinges revealed that there were four standard sizes and these could be modified by users to fit a wide spectrum of requirements, making it possible to eliminate 68 kinds of hinges. His report and

Specialist 6 Jimmy R. McGee, noncommissioned officer in charge of the Fort Leonard Wood Reception Station Dental Clinic, found that marking on dental X-ray film with a felt-tipped pen was easier, faster and less expensive than using radiographic tape. The new identification method is saving nearly \$3,000 yearly at that installation.

Men who enter the Army at Fort Leonard Wood receive their initial dental examination at the Reception Station Dental Clinic. Each hour of the day the clinic examines and X-rays the teeth of approximately 40 inductees.

Each X-ray is marked with the man's last name and last four digits of his Social Security number. The practice had been to accomplish the identification with radio opaque tape applied to the numbered film. The tape was marked before processing the film. Often the identification marks were illegible after development.

McGee found that the opposed radiographic film could be marked in the center after development with a felt-tipped pen. He realized by making the identification marks immediately after development, the ink penetrated the emulsion of the film and became indelible.

McGee estimated that more than ninety-two 100-foot rolls of the opaque tape were used annually for identifying the X-rays of inductees. Since the price of a roll of tape is approximately \$30, it cost nearly \$3,000 annually to mark 55,000 pieces of film.

Inasmuch as one felt-tipped pen cost 8 cents and lasts a week, X-ray identification is reduced to \$4.16 a year.

McGee received a cash award of \$250 for suggesting this money-saving technique of dental X-ray film identification.

recommendations were forwarded to technical personnel of the Army, Navy and Air Force, who agreed.

Stocks of the 68 hinges eliminated will continue to be used until exhausted.

FOILED NO MORE

Encasing the projector with tinted glass costs less than wrapping vu-graphs in blue transparent foil and produces the same result.

The Air Force Systems Command Air Force Western Test Range formerly covered vu-graphs with foil to reduce glare and rear screen "hot spotting" at a cost of 35¢ each for material, plus labor. Three thousand vu-graphs were processed annually.

Today, as a result of an employee suggestion, the projectors are covered with Solex glass which is tinted, transparent, and heat resistant.

The new procedure is saving the Air Force \$1,400 a year.

FUZES CANNED INSTEAD OF BAGGED

Lawrence E. Deaton of the Navy Ships Parts Control Center saw where money could be saved in a procedure that called for packaging in individual containers some fuzes destined for short-term storage.

Deaton is an industrial specialist at the Mechanicsburg, Pa., activity. He discovered that the Navy's packing instructions called for hermetically sealing individual Mark 342 Model O mechanical time fuzes in a metal can that was then placed within a protective wooden box. Since such ammunition was reassembled at Navy ammunition depots shortly after receipt, Deaton recommended placing the fuzes in plastic bags which would then be packaged in corrugated paper boxes. He also had them palletized.

The dual idea—the savings in packaging and the palletizing for ease of transportation—was tested by the Naval Ordnance Laboratory at White Oak, Md., which then gave SPCC the green light to make the changes in the manufacturing contract. The changes in two contracts alone saved the Navy \$48,000.

Since then, several other contracts have been modified

to permit the packaging of fuzes shipped from manufacturers to naval activities.

Deaton's perception won him a \$940 Superior Achievement Award. (See photo.)



\$6 MILLION ADAPTER



Walter K. Sterling demonstrates adapter kit he developed for multiple- and triple-ejection bomb racks which will save the U.S. Navy more than \$6 million.

A 6-inch-long piece of metal can convert a real bomb ejector to a practice one for planes running bombing drills—a fact that saved the Navy \$6.3 million in fiscal year 1970. The metal flange makes it possible to secure MK-76 and MK-106 practice bombs on multiple and triple ejector racks. This adapter eliminates the need for procuring, stocking, inventorying, and maintaining practice bomb racks for training flights.

The practice racks presented many problems to the fleet. Inadvertent releases, poor reliability, and excessive maintenance requirements were common. The racks were used only in training and failed to provide pilots or maintenance crews the opportunity to become familiar with the operational multiple and triple ejector racks.

The adapter kit eliminates the need for practice racks in all tactical air and S-3 aircraft units. In addition, pilots and aviation ordnancemen can receive increased training in the use of the operational multiple ejector racks they will use under combat conditions.

Intangible benefits from Mr. Sterling's idea are realized by eliminating the storage and maintenance of the practice racks by fleet activities, thus making available more spaces and freeing personnel for other duties.

This is the largest single savings ever recorded at the Naval Air Test Center, Patuxent River, Md., and one of the largest to be validated by the U.S. Navy.

A resident of Leonardtown, Md., Mr. Sterling has been employed at Patuxent River for the past 19 years, with the last 12 of those working at Weapons Systems Test.

FUEL DRAIN-TIME LOWERED

A tool designed by an NCO with the 9th Weather Reconnaissance Wing at McClellan AFB, Tex., has cut by 84 percent (2½ hours) the time needed to drain excess fuel from wing tanks on C-130 Hercules aircraft.

Formerly, fuels people had to physically hold the fuel sump draining device "pogo stick" and depress the drain valve.

Or, alternately, they depressed the valve with the "pogo stick," propping it in the fuel drain bowser and securing it with wire or vice-grip pliers.

Either way took three men 3 hours to do the job.

Then came Sergeant Harold A. Roche who developed a tool that screws into the drain sump and depresses the valve that permits excess fuel to drain through a hose into a receptacle in just one-half of a man-hour.

The tool which has an Air Force drawing number and is authorized for use at all 9th units, will save the weather wing approximately \$18,000 per year.

SAVING DOES THE HEART GOOD

What does flying do to the heart?

Whatever it does, it now costs less to find out at the USAF School of Aerospace Medicine. How come? Because the school's Physiological Dynamics Division now measures heart stress with a device costing \$4 to make in-house instead of \$60 purchased commercially.

The School is studying cardiovascular response to environmental stresses like acceleration, hypoxia, and hypercapnia. To do this, a sonic dimension gage (small and disc-shaped) is attached to the heart of an experimental animal to measure blood flow to the brain, heart, and other vital organs.

The School uses about 20 sensors per month. That's a \$13,440 saving annually on the \$56 reduction per unit.

RADOMES MADE USABLE

Letterkenny Army Depot found 15 usable missile radomes among 50 rated "unusable" and thus saved the Army \$11,800. A radome is the covering or shield for a radar.

The depot modifies unusable missile radomes for use in dummy (training) missile assemblies. During the preliminary modification processing of 50 radomes, several were found to be in better condition than is normal for training equipment. These were separated and examined for repairability. As a result, 15 radomes were found to be economically repairable, and the procurement of 15 new radomes was therefore eliminated.

A SIGN IS NOT A MOUSETRAP

Number the building better so the world can beat a path to your door. Well, maybe not the world but at least the Army which appreciated Oliver Keefer's idea for fabricating and installing building number signs at cut rates.

Keefer, a branch chief in the Maintenance Division at Fort Detrick, Md., thought it was just too cumbersome to cut the design from a sheet of metal, cut a sheet of reflecting material of the same design, join the two and install them on a building by drilling holes through the metal and using bolts and acorn nuts.

The Keefer way is to bake a preprinted shield of Scotchguard material onto a "light-gage metal." The sign is then attached to a building with an adhesive. The technique saves both labor and materials to the tune of \$1,000 annually.

BOXERS AND BOXES

Boxers aren't the only ones who have to make the weight. So do the boxes that hold military equipment.

Twenty pounds was the critical shipping weight limit for the communication set—and that included the 9-pound radio, two batteries, test equipment, handset, carrying harness, and shipping case.

Martin Rottenberg, an Air Force engineer with the Electronic Systems Division at Hanscom Field in Bedford, Mass., showed that an aluminum shipping case would be lighter, stronger and less expensive than the fiberglass case prescribed in the specification. The switch saved the Air Force \$75,300.

"The new radio will replace a 65-pound model now in use," explained Mr. Rottenberg. "This weight reduction makes a big difference when operating in jungle or mountainous terrain," he added.

ADJUSTMENT CURES CIRCUIT BREAKERS

Fifty percent of all generators of a certain make, when overhauled at the Kaiserslautern Army Depot, Kaiserslautern, Germany, required the replacement of master circuit breakers (FSN 5925-012-4396). The high cost of these items (\$193.81 each) convinced personnel of the Depot's Maintenance Division that a way had to be found to repair the circuit breakers.

Research and tests showed that circuit breakers could be made operational by simply adjusting two screws. As a result, Kaiserslautern Army Depot no longer needs to buy 43 circuit breakers annually as replacements, thus saving \$7,975.21 a year.

IDEA DOES DOUBLE DUTY

We know of a lady who felled two pigeons with one boulder (or something like that.) Her idea:

1. Saved \$124,600 (in the Reuse of Excess category of the Cost Reduction Program), and
2. Satisfied 1,341 on-hand, overdue requisitions (in the Reduction of Backorders category of the Logistics Performance Measurement and Evaluation System.)

The story begins (and ends) at the Defense Electronics Supply Center (DESC) in Dayton, Ohio. The Center is a field activity of the Defense Supply Agency.

The Center had a need for 6,390 loudspeaker assemblies, a permanent magnetic-type unit of audio equipment which is weather, gunblast, and moisture resistant. DESC had no stock on the item and it appeared a procurement would be necessary to fill past, present, and future demands.



Angela Foley studies one of loudspeaker assemblies she acquired from another supply activity which wiped out 1,341 backorders, gave DESC a 2.6-year future supply and saved a grand total of \$124,605.

Miss Angela Foley, an inventory management specialist at the Center, decided to search through other defense inventories. She found that the Army Electronics Command in Philadelphia had 6,392 similar assemblies which were excess and were being considered for disposal. The excess part was listed as a Marine Corps used item and a nonpreferred assembly in relation to the one originally requested—a unit coded for all services.

Miss Foley, sensing the potential of a major savings and a dramatic solution to her supply problem, re-

quested DESC and Army technicians to research the two parts and determine if they were interchangeable. Study indicated that the two parts were identical, but not coded as interchangeable.

According to Miss Foley, there were 1,341 backorders on file for the originally requested part. She therefore contacted all requisitioners and gained their approval on the replacement item. The Army shipped items on backorder directly to the customers and transferred the excess amount to DESC.

Center officials indicated that because of the stock received, all outstanding procurement actions were canceled for the preferred part. In fact, the amount received represented a 2.6 years supply, based on predicted annual demands.

REPAIR UNHINGES PRICE

New Cumberland Army Depot can make an old, corroded hinge look like new for \$27.35—and if that seems like a pile of dough, just remember that a new hinge would cost \$114. So repair is really a bargain, saving the Army \$86.65 per hinge.

What kind of hinge costs \$114 brand new? One made of a magnesium-steel alloy and used to connect the loading ramp on the CHINOOK (CH-47) helicopter to the fuselage. The hinge is designed to stand up under heavy weight and strong punishment.

During the overhaul of battle-damaged Chinooks, corroded hinges were being replaced with new ones. Allen M. Flickinger, an aircraft quality control specialist, noticed this. He suggested that the old hinges could be made usable again by refinishing them with a structural adhesive and then baking and painting them. His suggestion worked—saving the Army more than \$15,000 a year.

MORE ECONOMICAL REPAIR FOR EXHAUST DUCTS

When a crack showed up in the liner of No. 4 exhaust duct on a particular model aircraft engine, ducts Nos. 1, 2, 3, and 4 had to be removed in order to make repairs. That used to be the procedure in the Engine Maintenance Shop of the 75th Tactical Reconnaissance Wing at Bergstrom Air Force Base, Tex.—per TO 2J-79-46, and it consumed a lot of man-hours because approximately 96 percent of liner cracking occurred in the No. 4 exhaust duct liner. Today the Maintenance Shop can weld cracks in the liner of No. 4 exhaust duct without disassembling the entire exhaust system. This new procedure will save a bundle.

Approximately 300 exhaust assemblies are found cracked each year. With the revised maintenance method, 115 man-hours per assembly will be saved—and those saved man-hours are worth \$8,337 annually.

MOVING EXPERIENCE

What do you do with ration supplements that missed their scheduled boat to Vietnam?

- Move them from the assembly plant to a Defense depot until new bottoms become available and then relocate the items to the port (cost—\$57,550)?
- Or, store them at the assembly contractor's plant (at a cost of \$58,522) pending arrival of the ships?

Answer: Neither

Confronted with these alternatives, Cory P. Traver, a commercial warehouse service officer at the Defense Supply Agency's Defense Personnel Support Center, conducted negotiations with commercial storage facilities in the area of the assembly plant.

Competition produced by this negotiation prompted

the original contractor to reduce his storage price to \$24,952.25. His new offer was accepted.

FILM REPLACES ACETATE AS VU-GRAPH OVERLAY

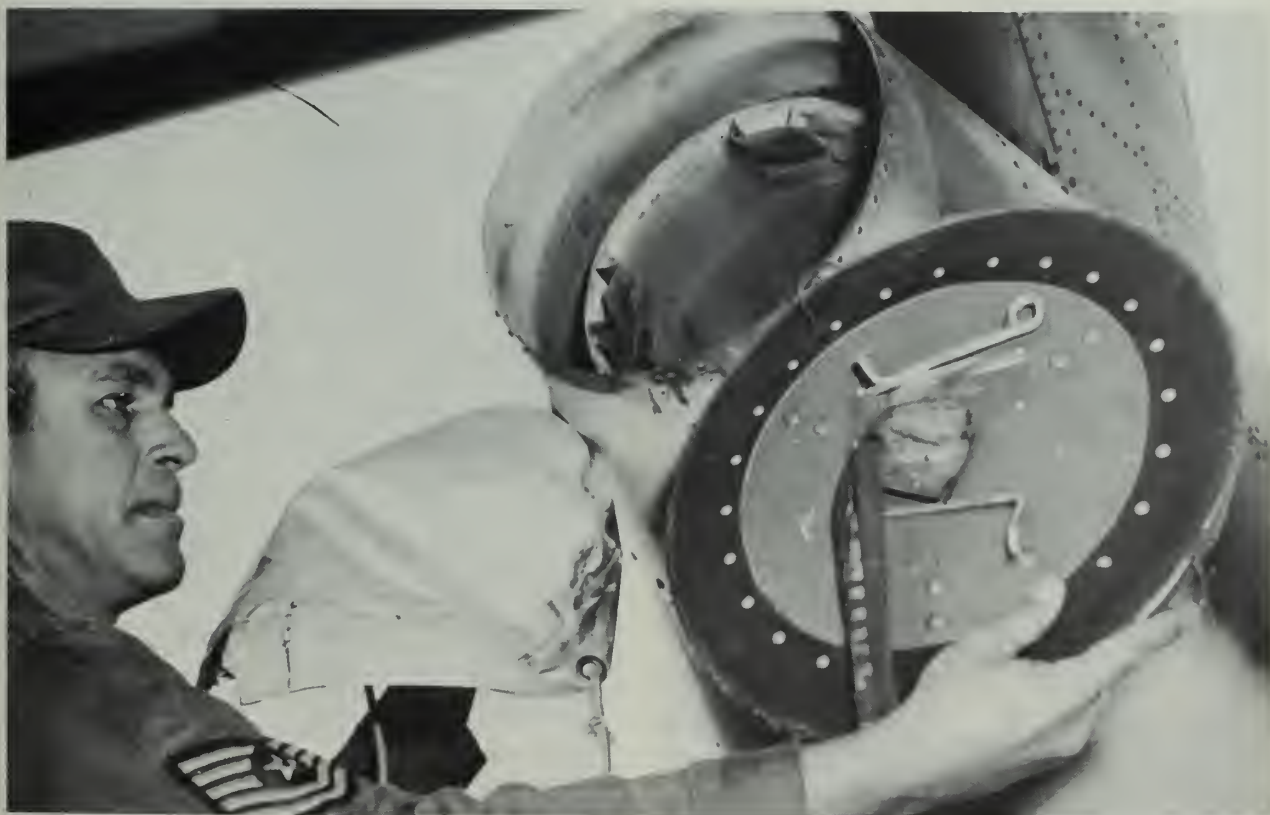
Students at the Armed Forces Air Intelligence Training Center (AFAITC) were using 123 rolls of acetate annually to make overlays for vu-graphs in the basic airman and officer courses until SSgt. Charles R. Reeves, Department of Intelligence Training, found that about-to-be destroyed film could be substituted for the acetate. Acetate costs \$7.80 per roll for a total cost of \$959.40 each year. The film's salvage cost was \$137.27. The difference of \$822.13 represents a saving to the Air Force.

CANVAS AND CORD FOR METAL

Covers made of waterproof canvas instead of metal now keep dust and foreign objects out of front and rear ends of the J-85 engines (used on the C-123) at the 4408 Combat Crew Training Squadron, Hurlburt Field (Eglin Auxiliary Field #9), Fla. Bungee cord secures the canvas covers to the engines.

The metal covers cost \$389. The canvas/cord combination costs \$5. Since the metal covers were being lost or destroyed at the rate of 44 a year, savings are now totaling \$16,909 annually.

Sgt. James A. Head suggested the more economical cover.



Technical Sergeant David A. Haughee, Flight Chief, 319th Special Operations Squadron, is shown demonstrating the old J-85 engine cover on the right, costing \$389.30 each. On the left is the locally suggested and adopted substitute which costs \$5 to locally manufacture and lasts indefinitely.

THREE IDEAS RACK UP \$92,500

Three ideas for improved operating procedures recently implemented at 2d Logistical Command, Machinato, Okinawa, brought a total of \$2,210 in awards to the men who suggested them. That's a small amount, however, in relation to the savings which the Army, and ultimately the U.S. taxpayer, will realize as a result of adoption of these ideas.

Together, the three suggestions for improved procedures will result in estimated savings of \$92,500 in the first year of use alone.

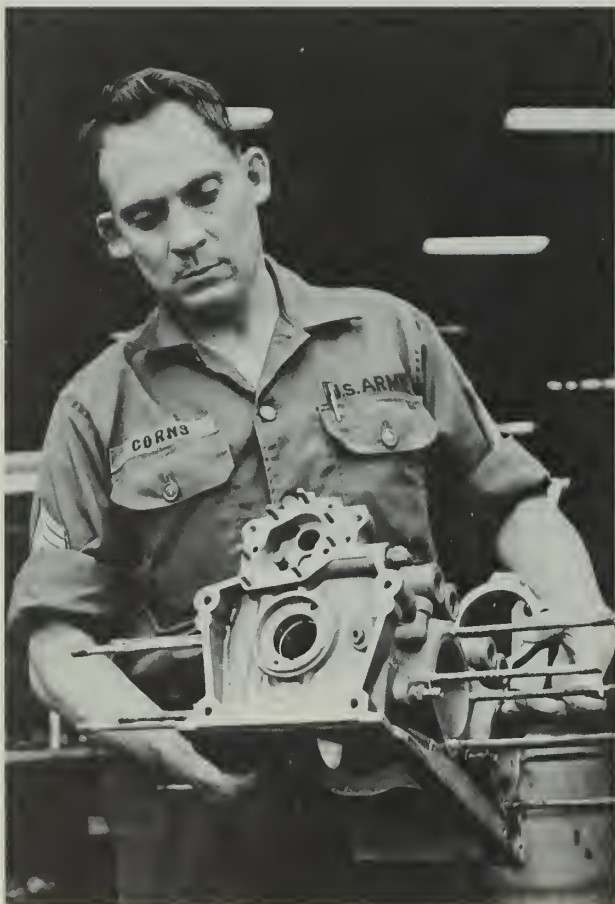
Largest dollar savings of the three will result from a method of reclaiming engine blocks from 10 and 20 horsepower generator engines overhauled in the Electrical Equipment Branch of 2d Log's D/MO (Directorate for Maintenance Operations).

Previously, if excessive bearing wear was found in an engine being overhauled, the entire aluminum block had to be salvaged, since replacement bearings were not available through the supply system.

Staff Sergeant James Corns realized that it would be cheaper to bore out the worn bearings and insert new ones than to replace the entire block. Together with Chief Warrant Officer James A. Green, Corns developed a practical system of doing this on an assembly-line basis, using bronze bearings fabricated in 2d Log's machine shop.

Since this process—known as line-boring the blocks—was initiated, some 4,000 engines have been rebuilt, resulting in an estimated first-year savings of over \$67,000 for the Army. None of the engines overhauled so far using the new process have been returned to 2d Log because of oil leakage due to bearing wear.

A noncommissioned officer in the Communications and Electronics Branch of D/MO received an award of \$520 for a suggestion involving a completely different



type of equipment but the same basic principle as that in Sergeant Corns' suggestion.

Staff Sergeant Luther E. Smith likewise saw an opportunity for reusing a relatively expensive component by replacing only the specific damaged parts of it rather than the entire unit.

Battery contact springs must be replaced in about 80 percent of the field telephone switchboard units repaired by the branch. Since the springs alone are not available through supply channels, the entire battery box, costing \$28, was being replaced.

Sergeant Smith arranged for the springs to be fabricated within 2d Log so that battery boxes for the switch-



Left: Sergeant Corns examines an engine block which has been line-bored and fitted with new bearings, an idea he suggested to permit reuse of worn blocks.

Middle: Staff Sergeant Luther Smith holds a pair of the springs (right) which, as a result of his suggestion, can now be replaced independently of the battery box at left.

Above: A better towbar is what Staff Sergeant George Thompson helped build. The new towbar will speed up movement of retrograde vehicles at 2d Log.

board can be reused in most cases. First year savings due to the change are expected to be \$9,305.

The third major dollar-saving innovation has resulted in a substantial speedup in movement of unserviceable retrograde vehicles by 2d Log tactical wrecker trucks. An award of \$705 went to the officer and three enlisted men who came up with a custom-designed towbar, since the model available through supply channels wasn't suitable for towing trucks without bumpers or towing shackles.

TV AIDS BUYER

Disturbed by the price of an electronic switch which he had to buy, William O'Keeffe achieved cost reduction through use of a television set.

The incident occurred recently when Mr. O'Keeffe, a buyer at the Defense Electronics Supply Center (DESC), Dayton, Ohio, felt that the price of \$49.05 per unit was high for the type of item he needed. He decided that "eyeballing" the item would be a good idea and made use of the closed-circuit TV system the Center utilizes, allowing a buyer to view an item in the warehouse without leaving his work area.



William O'Keeffe requests view of item located in DESC warehouse over the Center's closed-circuit television system.

Mr. O'Keeffe's conclusion was that an alternate source ought to be sought out. A source was found which bid \$19.35 per switch, resulting in a saving of \$1722 on the procurement.

Mr. O'Keeffe insists part of the credit goes to the system: "Buyers simply don't have time to run over to the warehouse whenever an item needs looking over—the TV system brings the item to us."

The Defense Electronics Supply Center is a field activity of the Defense Supply Agency.

NAVY TO SWITCH TO ALL DISTILLATE FUEL FOR SHIP PROPULSION

The Department of Defense has authorized the Navy to shift to a new fuel for ship propulsion.

An all-distillate marine diesel type of fuel will replace, on a gradual time-phased basis, the Navy special fuel oil now in use. The shift was approved on the condition that the new fuel be introduced in such a manner as to allow industry to adjust to the new requirement. A 3-year phase-in period was considered minimum, with no large procurements in the first year.

Under these guidelines, procurement of the new fuel could start as early as March 1970 and reach a peak, now estimated at 46 million barrels a year, by February 1972.

The shift was based on extensive research by the Navy. The present Navy special fuel oil is high in sulphur and metallic mineral ash-forming compounds which create excessive deposits of soot and slag requiring frequent boiler cleaning and other shipboard maintenance.

Use of the all-distillate fuel will greatly reduce shipboard boiler repairs and maintenance with resultant improvements in ship readiness. It will practically eliminate the exhausting job of routine fireside cleaning by boiler tenders.

Adoption of the all-distillate fuel will also reduce the

number of varieties of main propulsion fuels now being used in the Fleet.

Even though the new fuel will be more expensive (about \$58 million more per year) operating costs will be reduced by decreased maintenance, fewer repairs, etc. Total benefits are estimated to be in the millions of dollars per year when the new system is fully implemented.

Certain preparatory steps must be accomplished before ships of the Fleet can burn this fuel. For example, shipboard fuel pumps must be modified or replaced in many instances. Piping will be tested and repaired as necessary to handle the less dense fuel. Ashore, stocks of Navy special fuel oil must be drawn down and the tankage prepared for the new fuel. The oil industry will require sufficient advance notice of the phase-in plan in order to provide the required quantities. The actual shift will be so timed as to permit an orderly changeover during the recommended 3-year period until the entire Fleet is converted.

The interim specification for the new fuel, MIL-F24374 (Ships), is being printed. It will be available to interested suppliers around the end of March 1969 by writing to the Navy Publication and Forms Center, NPSC-103, 5801 Tabor Avenue, Philadelphia, Pa. 19120.

TOPS COST REDUCTION GOAL

The Norfolk Naval Supply Center saved more than a million dollars during the fiscal year just ended as a result of an effective cost reduction program.

The final figure was \$1,009,900.

This was more than double the goal originally assigned to the Center by the Naval Supply Systems Command in Washington. Mrs. Esther Toro, NSC cost reduction coordinator, said this was the second straight year that the Center attained over 200 percent of its goal.

Cdr. Billy Mitchell, NSC comptroller, commenting on the accomplishment, said that it was especially significant this year because the assigned goal was originally set at \$400,000. Early in the year the Department of Defense raised the Navy's cost reduction goal by 25 percent which added another \$100,000 to the Naval Supply Center's original figure.

Other departmental totals for Fiscal Year 1970 were: Material and Provisions, both with \$67,000; Data Processing, \$52,700; Inventory Control, \$45,000; Fuel, \$28,000; Nuclear Weapons Supply Annex, \$22,000; Administrative, \$11,000; Joint Household Goods, \$7,200; Cheatham Annex, \$7,000 and Civilian Personnel, \$3,000.

Commenting on the success of the Cost Reduction Program at the Norfolk Naval Supply Center, Rear Admiral B. H. Bieri, Jr., former Commander of the Naval Supply Systems Command, wrote a letter to the command stating, "This is the second year in a row that NSC Norfolk has led the field. This clearly demonstrates the responsiveness of your activity to the needs of the Supply Systems Command and the Navy." The letter went on to say, "NSC Norfolk's demonstrated leadership in this program is, I am certain, a true reflection of their overall performance."

HAND-IN-GLOVE SAVINGS



Cost reduction is the order of the day at Defense Depot Tracy, California, as Mrs. Arnita Yepez (right) displays a leather-palm glove to Mrs. Josephine Grana-does. The new glove replaces the more expensive all-leather, heavy duty work glove which women packers had been wearing. The action is expected to result in a savings of more than \$670 a year at this West Coast Defense Supply Agency installation.

GIANT DCA "CHECK"

Five members of the staff of the Defense Communica-tions Agency (DCA) Western Hemisphere, Fort Carson, Colorado, recently shared cash awards totaling \$3,366 (\$2,643.12 "after taxes") for eight Cost Reduction Program suggestions implemented in FY 1970. Shown with the giant "Check" are (left to right): Major Aldoran Belisle, Jr., USA; E. J. Schaffer, C. W. McKel-vie, A. P. Beaton, and E. E. Doerffel. Their suggestions resulted in annual savings of \$349,600.00.



Major Belisle, received \$560.00 for the consolidation of USAF Air Traffic Control circuits in the North At-lantic Area, resulting in a savings of \$30,200.00.

Mr. Beaton received three cash awards, \$470.00 for special routing of USAF high speed data circuit caus-ing a savings of \$14,800.00; \$622.00 for changing Strategic Air Command voice circuit from foreign sub-marine cable facilities to satellite and government owned facilities resulting in annual savings of \$147,-700.00; and \$745.00 for the reconfiguring of three Air Defense Command circuits resulting in annual savings of \$63,900.00.

Mr. Doerffel received \$249.00 for eliminating the need for special alarm equipment in Cheyenne Moun-tain, Colorado Springs, Colo.

Mr. McKelvie received two awards: \$310.00 for discontinuing special circuit between Cheyenne Moun-tain and Offutt AFB, resulting in annual savings of \$39,700.00 and \$240.00 award for replacing service provided by special dedicated voice circuit with com-mon user AUTOVON service resulting in savings of \$16,500.00 annually.

Mr. Schaffer received \$170.00 award for eliminating leased AUTOVON monitoring equipment resulting in savings of \$13,200.00 annually.

HRL STARTS THIRD YEAR



Linda Laurence looks over the stack of documents that represent the contracts for research projects moni-tored by the Air Force's Human Resources Laboratory at Brooks AFB, Texas. This month marks the start of the third year for the organization which is responsible for planning and executing Air Force exploratory and advanced development programs for personnel selection, motivation, training, education and career development.

GASOLINE STATION

The Department of Defense employs about 2,000 retarded workers—equivalent to one-third of the retarded people employed by the Federal Government.

Three hundred sheltered workshops (of a total of 1,500) are performing work under defense contracts and subcontracts.

Bernard Posner, Deputy Executive Secretary of the President's Committee on Employment of the Handicapped, told us of a recent experience of his that we felt conveyed as strong a resource-utilization message as it did a lesson in human relations. We asked him to retell his experience in writing. Here it is. We have changed only the names.

—EDITOR.



MY WIFE and I drove into the gas station at 8 o'clock that Saturday morning, a rattling and clanging under the hood of our new blue car. We were on a back road, 30 miles south of Scranton, heading for Washington.

Two men standing side by side watched us pull up. One was tall, sandy-haired, square-shouldered, in his thirties; the other was shorter, black curly hair, laughing eyes, in his twenties.

"Fan belt?" I guessed.

"Water pump," said the tall man.

"Yeah, water pump," echoed the shorter man.

The tall man who owned the station said he'd try to locate a new water pump but that it would take a couple of hours. Our faces fell.

He invited us into his small office. To make conversation he said, "Been visiting relatives in Scranton?"

"No. I attended a meeting of the Retarded Children's Association."

"I think my helper, Curly, is retarded," he said. I thought this was one of those sick jokes—the word "retarded" as a gratuitous insult. He sensed my feeling. "No, I really mean it," he insisted. "C'mon in the repair shop with me."

He talked as he started removing the damaged water pump. His name was Chuck; he had owned the station for a year. Curly was outside, waiting on customers.

"Curly lives across the street in that old farmhouse," Chuck said. "When he came to work a year ago he couldn't count beyond 10. And he couldn't sign his name; he used initials, C. T."

"Is this his first job?"

"No, his second. He worked for a while in a slaughter house, slitting the throats of cattle. All day long, killing cows."

* * * *

"First thing I did," Chuck recalled, "I taught Curly to count to 100. That took weeks.

"And I taught him to write his name. I made him sit in the office over there, and write each letter 5,000 times. He sure learned!"

Chuck had the water pump almost completely disassembled. He called outside to Curly. "Curly, how about bringing me the 5/8-inch wrench?" Curly came running, wrench in hand. He went back outside to take care of a customer.

"Curly don't know 5/8 from a hole in the ground," Chuck said. "But I showed him that a 5-slant-8

"It is the policy of this administration, in staffing the Federal service, to give full consideration to the employment and selective placement of the handicapped. * * *

"Therefore, I ask each of you to make a commitment to removing any remaining barriers to the Federal employment of

—the physically impaired who are not occupationally handicapped when assigned to the right jobs.

—the mentally restored whose only handicap is that they once suffered an emotional illness.

—the mentally retarded who can demonstrate ability to perform the simple and routine tasks that need doing in all organizations regardless of size. * * *

I am confident that you will give this policy your earnest support."

RICHARD NIXON.

(From the President's Memorandum of April 21, 1969, to Heads of Executive Departments and Agencies.)

means $\frac{5}{8}$; or that a 1-slant-2 means $\frac{1}{2}$. He doesn't have to know what they measure as long as he can bring me the right wrench when I need it."

* * * * *

Can Curly handle money? Well, yes and no.

He has a tough time with change, Chuck said. To buy cigarettes from the machine, he puts in a coin (he's not sure what coin) and pulls the handle. If nothing happens he puts in another coin and pulls the handle. And another. Finally when enough money is in the machine, out pops the pack of cigarettes, with the correct change. Who needs to count?

"I let Curly carry a roll of bills in his pocket, same as all the other gas station people," Chuck said. "Look at him." Curly was standing by a gas tank, proudly fingering his money.

"I also let Curly go to the bank for me. He carries a lot of dough, couple of thousand dollars at a time. First he'll go home and shower and change his clothes. Then he'll get over to the bank and strut in like he owns the place. It's good for him. Makes him feel like he's a somebody."

* * * * *

The new water pump had arrived. Chuck was installing it.

"I been taking Curly to some good restaurants. He had such a crummy life I thought it's time he got some nicer experiences.

"First time we went, I ordered a martini. Curly decided he'd have one, too. First martini of his life.

"He tasted it and made a face. He called the waiter. 'Bring me a Seven-Up.' He mixed the martini with the Seven-up. 'Man, that's drinkin,' he said. He's been ordering it ever since."

The gas company held a meeting for station managers in the Scranton area. They were invited to bring their most promising employees. Chuck brought Curly.

Later, Chuck asked, "How did you like the meeting?"

"Boy, did you see all them fancy lights in the ceiling of that room?"

* * * * *

What happens after work?

"Well, Curly goes home at five. He shaves and showers and puts on his good clothes. Then you know what he does? He comes right back over here. Just to hang around. This place is his life. His whole life."

* * * * *

Finally the water pump was installed. We were ready to leave.

I took Curly aside. "Do you like Chuck?"

"Like my old man," he said earnestly.

As I was paying the bill, I asked Chuck, "You like Curly?"

"Like a son," he said.

My wife and I drove out of the station. Chuck and Curly were standing side by side. Chuck waved. Curly waved.

A bend in the road and they were out of sight. □





• Aber, John W., Jr., and Paul W. Garber, "The Navy and the Merchant Marine: A Critical Coalition," *U.S. Naval Institute Proceedings*, March 1970, p. 40-4.

(Note: Lt. Cmdr. Aber is a doctoral candidate at Harvard University Graduate School of Business Administration. Mr. Garber, USNRes, is a partner in a Boston law firm.)

The U.S. Navy's Naval Control of Shipping Organization is responsible for the protection of U.S. merchant shipping. The failure of the NCSO, however, to adjust to new weapons technology and to the changed maritime strategic situation has endangered the safety of U.S. shipping. Maritime trade is vital to the logistic support of military operations overseas. The Vietnam war has shown that air transport is not as efficient as naval transport in preplacing needed fuel supplies, fixed bases, and numerous aircraft. Yet the large-scale movement of men and war materiel by sea requires a form of protection currently not supplied by the Navy.

• Botner, Stanley B. Four years of PPBS: an appraisal. (In *Public administration review*, July-Aug. 1970, v. 30, p. 423-431)

Evaluates the effects of the PPBS program, considers the reasons why the program has not been more successful, and describes steps taken to correct some of the shortcomings.

• Chandler, Alfred D., *The War Years: The Papers of Dwight David Eisenhower*, Baltimore: Johns Hopkins, 1970, 5 vols., \$75, 3,110 pp., reviewed by Gordon Craig, *New York Times Book Review*, May 17, 1970, and Henry Raymont, *New York Times*, May 8, 1970.

These first five volumes of a projected 20-volume series cover the period from October 1941 to May 1945, tracing Eisenhower's rise to the position of Supreme Allied Commander, and include some 2,500 selected military orders, letters, and memoranda.

• Cibinic, John, and Jesse E. Lasken. *The Comptroller General and Government Contracts*. (In *George Washington law review*, Mar. 1970, v. 38, p. 349-395)

From both a legal and administrative viewpoint the authors question "the intervention of the GAO in the active formulation of procurement policy and in agency operations." Instead, they suggest legislation to with-

draw the General Accounting Office "from the bid protest, disputes, and settlement of claims areas" concentrating instead on a "strengthened and broadened auditing and reporting function."

• Close up: Packard: defense on a diet. (In *Dun's*, August 1970, v. 96, p. 10-14)

An interview with Deputy Secretary of Defense David Packard during which Mr. Packard discusses both the size of the defense budget and changes in the organization of the Defense Department.

• Drucker, Peter. What Communication Means. (In *Management today*, Mar. 1970, pp. 90-93+)

"Communications in organization are not a means of organization; they are a mode of organization."

• Enger, Norman L. *Putting MIS to Work; Managing the Management Information System*. New York, American Management Association 1969. 255 p.

Treats three major problem areas in detail: The need for comprehensive error detection, audit, and security procedures; the need for improved standards of software performance and dependability; and the need for greater hardware uptime and reliability.

• Goulding, Phil G., *Confirm or Deny*, New York: Harper & Row, 1970, \$7.95, 369 pp.

(Note: Mr. Goulding is a former Assistant Secretary of Defense for Public Affairs.)

The office of the Assistant Secretary of Defense for Public Affairs is confronted with hundreds of crises each month involving the Secretaries of the military services, the Secretary of Defense, and the President of the United States. From among the many crises which confronted him during his 4 years in the Pentagon, Goulding has selected 10 to illustrate the complexities facing the DoD in trying to keep the American people informed about military affairs.

• Greenberg, Edward. *Government-Owned Plant Equipment Furnished to Contractors: An Analysis of Policy and Practice*. Santa Monica, Calif., 1969. 48 p. (Rand Corp. Research memorandum RM6024-1-PR.)

One conclusion of the study is that profitability considerations in the face of uncertainty explain contractors' willingness to use Government-furnished equip-

ment (GFE). In particular, using GFE sidesteps two kinds of uncertainty: The possibility that procurement quantities may be reduced, and that another firm will obtain subsequent contract awards.

- Haiman, Theo and William G. Scott. *Management in the modern organization*. Boston, Houghton Mifflin [1970] 604 p.

In this work the basic insights and quantitative methods of social psychology, sociology, economics, and other behavioral disciplines are brought to bear on the principal functions of management.

- Holifield, Chet. *New Tool for Cutting Government Costs*. (In *Nation's Business*, February 1970, v. 58, pp. 58-60.)

Representative Holifield discusses the goals of the new Commission on Government Procurement.

- Lapp, Ralph E. *Arms beyond doubt; the tyranny of weapons technology*. New York, Cowles Book Co. [1970] 210 p.

Believes that "the United States needs to make the most searching examination of its national security in the light of the new technologies of our time." To support this view the author describes the new weapons systems of the seventies, the workings of the military-industrial complex, the problems of arms control, and the role of the scientists and the Congress.

- Levinson, Harry. *Management by whose objectives*. (In *Harvard business review*, July-Aug. 1970, v. 48, p. 125-134)

Argues that the technique of management by objectives in combination with performance appraisal can be improved "by examining the underlying assumptions about motivation, by taking group action, and by considering the individual's personal goals first."

- Novick, David. *A Balanced View of Cost Overruns*. (In *Business Horizons*, April 1970, v. 13, pp. 70-72).

Comments on military cost overruns.

- Oliver, Richard P., "Increase in Defense-Related Employment During Vietnam Buildup," *Monthly Labor Review*, February 1970, pp. 3-10.

(Note: Mr. Oliver is an economist in the Division of Economic Growth, Bureau of Labor Statistics.)

Between fiscal 1965 and fiscal 1968 defense purchases rose 80 percent, generating 2.1 million civilian jobs in 1965 and 3.6 million in 1968. The increase in defense purchases was attributable to Vietnam requirements, since DoD reduced expenditures unrelated to Vietnam. Thus, of the 3.6 million jobs generated by military purchases in 1968, about 1.4 million were due to the Vietnam involvement.

Direct defense purchases, particularly in the ordnance, aircraft, and electronic industries, accounted for half of the increased employment. The higher proportion of direct defense employment in these three industries resulted from DoD's policy of purchasing major

components directly from manufacturers and providing them to another prime contractor for assembly. This practice reduced the amount of subcontracting, lowering the amount of supporting employment, and increasing direct employment.

Most industries had less than 10 percent of their employment related to defense purchases, but aircraft and ordnance had more than 50 percent dependency. Dependency ranged from well below 1 percent in the tobacco industry to 77 percent in the ordnance industry. The proportion of defense employment increased from 1965 to 1968 in all industries except computers, and those industries most dependent on defense in 1965 remained so in 1968. There were increases of 42 percent in the ordnance industry, 27 percent in aircraft, 14 percent in miscellaneous machinery, and 12 percent in transportation. The ferrous and nonferrous metals industries, food processing, and petroleum refining were also strongly affected. These are the same industries which are likely to suffer from a cutback in Vietnam requirements, even though some of the slack will be taken up by other defense activities and demands from the civilian sector.

- Phillips, James G. *The Lockheed scandal: what really happened?* (In *New republic*, Aug. 1, 1970, v. 163, p. 19-23)

Explains the reasons for the cost-overrun of the C-5A jet transport and concludes that much of the two billion dollar overrun was avoidable by either the Government or Lockheed.

- Podnos, S. S. *A Critique on Weapon Systems Management*. (In *GAO Review*, Spring 1970, p. 10-15.)

Describes and discusses the two basic causes of the performance degradation, schedule slippage, and cost growth which occur in developing and acquiring weapons systems.

- Proxmire, William. *Report From Wasteland: America's Military-Industrial Complex*. Foreword by Paul H. Douglas. New York, Praeger [1970] 248 pp.

Growing out of Proxmire's investigations as chairman of the Joint Economic Committee's Subcommittee on Economy in Government, this report is an exposé of cost overruns and military waste.

- Silk, Leonard S. *The defense outlook*. (In *Conference board record*, July 1970, v. 7, p. 8-11)

Briefly discusses the size of the defense budget for fiscal 1971, pointing out the reasons for the cuts and the possibilities for the future.

- Stillman, Richard J., "What's Wrong With Military Leadership Today," *NATO's Fifteen Nations*, December 1969-January 1970, pp. 73-8.

(Note: Dr. Stillman, formerly a faculty member at the NATO Defense College, is professor of management at Louisiana State University in New Orleans.)

The failings of the military establishment can be cured only if its present mental framework can be imbued with innovation and dynamism. Thus, efforts should be made to retire every officer at the end of 30 years of service and retain only the top 10 percent of those with 20 years' service. Furthermore, the Armed Forces will have to provide young officers with a climate of self-realization and fulfillment. Sound management policies are direly needed, including the unification of all services in order to avoid duplication and waste. Withdrawal from Vietnam would have a salutatory effect by curtailing the vested interests of those who desire personal advancement at any price.

- Thompson, Victor A., "Bureaucracy and Innovation," University of Alabama Press, 1969, \$6, 167 pp., summarized by Carol-Lee Hurley, SAFAAR.

(Note: Mr. Thompson is a member of the Surgeon General's National Advisory Health Manpower Council.)

Public administration in the United States is in a singularly noninnovative stage. The Government seems unable to develop new approaches to many foreign and domestic issues. Once, new needs could be met by creating new organizations and abolishing the old ones. Now, this method of innovation is too expensive, given the capital requirements of current technology. At the same time, technological change is so rapid that the demands of new situations and the bureaucratic responses to them are increasingly divergent.

Organizations which provide for overlapping and duplicating efforts to solve a problem usually obtain better and newer solutions, faster and with less expense. "Slack" in the commitment of an organization's resources also fosters innovation. For the individual, innovation is more probable if he feels personally secure and is stimulated by others with different training and tasks. Optimism also seems to be important in innovation, arising when the choice lies between winning and breaking even, rather than between losing and breaking even. Military R. & D. contracting procedures, for example, have provided incentives toward optimism on both sides; this has been important in the successes achieved. A more businesslike, accurate contracting procedure would save money at the expense of innovation.

- Treires, James J. Arms and Employment: Kicking the Defense Habit. (In *Nation*, Feb. 23, 1970, v. 210, pp. 200-204.)

"If we are to succeed in getting off the military tiger, we must first bury some hallowed myths . . . We must admit that science and engineering have contributed as much to the current sad state of affairs as they have to the national well being."

- Trueger, Paul M. Defective Pricing in Defense Contracts. (In *Financial Executive*, May 1970, v. 38, pp. 64-71.)

Surveys developments in Government regulation of prices and costs in negotiated defense contracts since the passage of Public Law 87-653 8 years ago.

- U.S. Blue Ribbon Defense Panel. Report to the President and the Secretary of Defense on the Department of Defense. [Washington, U.S. Govt. Print. Off.] 1970. 237 p.

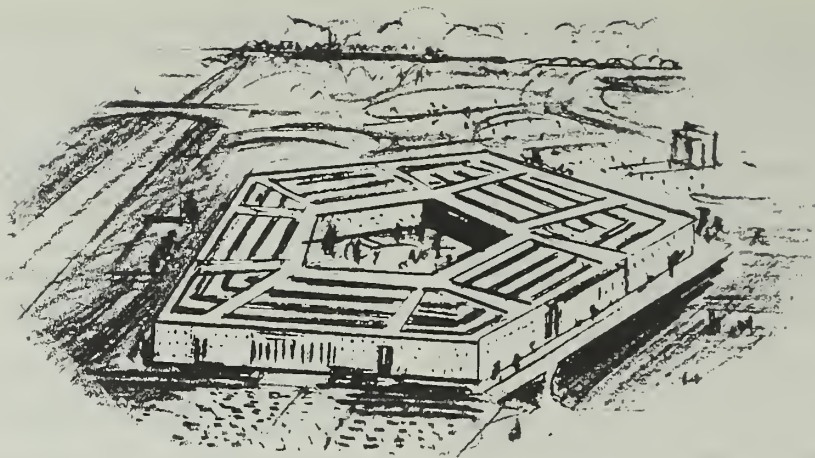
Gilbert W. Fitzhugh, chairman.

- U.S. Congress. Joint Economic Committee. Economic Analysis and the Efficiency of Government. Hearings before the Subcommittee on Economy in Government. 91st Cong., 1st sess. Aug. 12-Oct. 6, 1969. Washington, U.S. Govt. Print. Off., 1970. 3 pts. in 1 v.

Examines problems of management and control in the Department of Defense, resource allocation effects of maritime subsidies. Federal airport and airline policy, Federal urban development programs, medicare, Federal aid to higher education, water resource and pollution control programs. Part 3 of hearings focuses on budgetary procedures and policy analysis as it effects efficiency in Government.

- ——— Report of the Subcommittee on Economy in Government . . . together with supplementary views. Washington, U.S. Govt. Print. Off., 1970. 51 pp. (91st Cong., 2d sess. Joint Committee print.)

Recommends "a major effort to expand the comprehensiveness of the budgetary document." Other recommendations relate to acceleration of the effort to develop a "full Program Overview study" to be updated annually and submitted to the Congress as a separate report.



"I have recently put together a memorandum for the military departments and the defense agencies in the form of policy guidance to try and get the whole team here pointed in the right direction."

* * * * *

"... when you have a program manager who has to go through 10 or 15 different reviews—and sometimes it is that many—before he gets up to the service secretary, I think what happens is that these review procedures tend to have a veto power, but they don't make a positive contribution to the program."

"The concurrency problem between development and production is, as I have already said, one of the key items. We are going to look pretty hard at these programs to assure, to the extent we can, that the engineering design is completed, and the key technical problems have been resolved, before we move into production."

* * * * *

"... we are going to come down hard to minimize the use of letter contracts."

The quotations on this page were extracted from the remarks of Deputy Secretary of Defense David Packard at a press conference in the Pentagon on June 9, 1970. The subject of the press conference was Deputy Secretary Packard's memorandum of May 28, 1970, dealing with "Policy Guidance on Major Weapon System Acquisition." The contents of that memorandum appear in the next 3 pages of the Journal.

"This trade-off approach has to be set up so that it can be a continual process."

* * * * *

"What we are talking about here is to first to try and get more people into the management business."

* * * * *

"But we want to be sure before we go from the conceptual phase into the full scale development that a careful risk assessment has been made on the program; that there has been an appropriate amount of actual system and hardware design and testing; and that this question of trade-offs has been addressed."

"... we have come to the conclusion that cost plus incentive contracts are preferable for the development stage, both for advanced development and for full scale development."

* * * * *

"... we are going to push pretty hard to see if we can get all of the services to minimize change orders that are not priced, to at least get a ceiling price on the change order from the contractor before they implement it, and to the extent possible, get the cost negotiated before they move in on a change order."

POLICY GUIDANCE

ON MAJOR WEAPON SYSTEM

ACQUISITION

WE HAVE been considering within the Department, for over a year, ways by which we can improve acquisition programs for major weapon systems. Some steps have been taken which I believe are in the right direction (reference my July 31, 1969, memorandum), and it is now appropriate to move ahead in a concerted effort to firmly establish additional new policies and to implement them.

The prime objective of the new policy guidance is to enable the services to improve their management of programs. Improvement in the execution of these programs will be made to the extent the services are willing and able to improve their management practices. The services have the responsibility to get the job done. It is imperative that they do the job better in the future than it has been done in the past.

It is the responsibility of the OSD to *approve* the policies which the services are to follow, to *evaluate* the performance of the services in implementing the approved policies and to make decisions on proceeding into the next phase in each major acquisition program.

The purpose of this memorandum is to issue broad policy guidance which is to be translated into appropriate action by all services and agencies in new major weapons system acquisitions.

Management

Management in the services will be improved only to the extent that capable people with the right kind of experience and training are designated to manage these major programs—in fact all programs. In order to be effective, program managers must be given adequate authority to make decisions on major questions relating to the program both in the conceptual development stage and in the full-scale development stage. If capable people are going to be willing to undertake these important program management assignments, ways must be found to give them some incentive to do so. Program managers must be given more recognition toward career advancement in all of the services, and good managers must be rewarded just as good operational people are rewarded.

If our people are to develop the experience necessary for program management and are to utilize their experience, they must be assigned to a given program long enough to be effective.

The overall structure of the program management function in all services needs to be considered. Changes must be made to minimize the numerous layers of authority between the program manager and the service Secretary.

The entire management problem needs to be addressed under these simple guidelines: Put more capable people into program management, give them the responsibility *and the authority* and keep them there long enough to get the job done right.

Development

The cost of developing and acquiring new weapon systems is more dependent upon making practical trade-offs between the stated operating requirements and engineering design than upon any other factor. This must be the key consideration at every step in development from the conceptual stage until the new weapon goes into the force.

The program schedule (structure) is another very key consideration. It must make sense. It must allow time for accomplishing important task objectives without unnecessary overlapping or concurrency. The ideal schedule is sequential with enough slack time for resolution of those problems which inevitably arise in any development program.

Conceptual Development

It is crucial that the right decisions be made during the conceptual stage. If wrong decisions are made during this period, the problems that are generated cannot easily be overcome later in the program.

Any new program will contain some risk that the technology involved cannot, within reasonable time and cost constraints, be converted into practical engineering design which meets the desired operating requirements. There are three ways in which this technical risk can be minimized:

1. *Risk Assessment.* The first is to make a careful assessment of the technical problems involved and a judgment as to how much effort is likely to be necessary in finding a solution that is practical. A careful look at the consequence of failure, even of "low risk" program elements, is also critical.

2. *System and Hardware Proofing.* The second and only sure way to minimize the technical risk is to do enough actual engineering design and component testing in the conceptual development stage to demonstrate that the technical risks have been eliminated or reduced to a reasonable level. Component or complete system

prototyping, or backup development, are examples of this.

3. *Tradeoffs (risk avoidance)*. Since program risk and cost are dependent on practical trade-offs between stated operating requirements and engineering design, trade-offs must be considered not only at the beginning of the program but continually throughout the development stage.

Proposals for OSD approval of development programs shall include a description of how the service or agency intends to manage the program to include appropriate attention to (1) *Risk Assessment*; (2) *System and Hardware Proofing*; (3) *Trade-offs*. When a DCP is prepared, it shall reflect these in the management plan.

Small development projects which do not require specific OSD approval shall also be structured to reflect these considerations.

All new programs will be kept in the conceptual development stages until the responsible service Secretary and the OSD can be assured that the program is actually in the proper shape to proceed into full-scale development.

Full-Scale Development

Authorization to proceed into full-scale development will be given by OSD based upon a DCP and the recommendation of the DSARC. In making this recommendation, the DSARC shall consider in particular whether adequate risk reduction has been accomplished.

Even though risk has been adequately addressed during the conceptual development stages, full-scale development will uncover technical and engineering problems that need to be solved. Procedures shall be established in the development program by which these problems will be continually addressed in view of possible trade-offs with stated operating requirements, cost, and operational readiness date.

Furthermore, it is essential to have assurance that those problems encountered during the earlier development stages have in fact been solved. This requires that milestones be established to demonstrate achievement of objectives at appropriate points in the development program. These milestones shall include such things as completion of appropriate stages in the overall system design and testing of critical items of hardware, e.g., subsystems and components.

Consideration must be given in development to all matters necessary in a full operating system. This will include such things as maintenance, logistic support, training, etc. However, where these matters are dependent on the final production design, *as much of this work as possible should be delayed until the production stage*. In general, RFP's for the development stage should be carefully reviewed to eliminate demands for reports, documentation and work tasks which are not

absolutely necessary for the efficient accomplishment of the actual development work. These considerations and demands must be limited to those which directly contribute to the design of the system itself.

Production

The most important consideration before moving into full-scale production on a new weapon system is to have assurance that the engineering design is completed, that all major problems have been resolved, and this has been demonstrated to the extent practical by actual performance testing.

At the DSARC review when the decision is made as to whether to proceed into full production, I want the responsible service to certify that the following actions have been taken:

1. All of the milestones which demonstrate the achievement of a practical engineering design have been met.
2. All important engineering problems encountered during the development have been resolved with appropriate trade-offs with stated operating requirements so that the production, maintenance and operating costs are optimized.

The startup of production must be scheduled to minimize financial commitments until it has been demonstrated that all major development problems have been resolved. In most cases production engineering and production tooling are necessary to demonstrate that the engineering has been satisfactorily accomplished. It may also be necessary to develop and demonstrate new production processes, methods, and procedures. Thus, some limited expenditure on production may have to overlap development.

Contracts

In all our contracting, the type of contract must be tailored to the risks involved. Cost plus incentive contracts are preferred for both advanced development and full-scale development contracts for major systems. When the assessment of technical risk permits, such contracts should include provisions for competitive fixed-price subcontracts for subsystems, components, and materials. In many cases this will enable a major portion of the program to benefit from competition. When risks have been reduced to the extent that realistic pricing can take place, fixed-price type contracts should be used. But the contracting officer should have the flexibility to consider the technical capability of the contractor and other factors in selection of contract type. When fixed-price type contracts are used for development programs, the contractor's financial ability to absorb losses that might be incurred *must* be a factor in making the award.

It is, of course, desirable to award a fixed-price contract in a competitive environment. It has been proven to be difficult or impossible to achieve effective competition in a fixed-price contract for production for a major weapon system before full-scale development has been undertaken. Consideration should therefore be given to the use of a negotiated fixed-price contract after the development has progressed to the point that the production design can be realistically specified. To the extent possible, a contract negotiated under these circumstances should encourage competition for subsystems, components, and materials. In this way, a substantial part of the cost can be established in a competitive environment.

The use of letter contracts should be minimized. Change orders should not be authorized until they have been contractually priced, or until contractual ceilings have been established.

This guidance is provided to the services with the

understanding that it is to be implemented within the established DCP and DSARC policies. Other reports and reviews are to be kept to a minimum, but the lines of communication between OSD offices and service components must be kept open to insure actual programs are being implemented under this guidance.

To the extent that the above guidance conflicts with existing DoD directives and instructions, the policies stated herein will govern. Since these policies should be applied immediately, I would appreciate your distributing this memorandum to key personnel, including all program managers, involved in the acquisition of major weapon systems.

I want the appropriate regulations of OSD and the services and agencies to be changed or canceled to reflect these policies. I have asked the DDR&E to take the leadership in accomplishing this and have suggested September 1, 1970, as the date for recommending changes to me. ☐

AFMA OFFERS CONFERENCE PROCEEDINGS

A copy of the presentations made at the recent Armed Forces Management Association Conference held in Los Angeles, California, on 20-21 August 1970 can be obtained upon request from the Association headquarters, 1001 Connecticut Avenue, N.W., Washington, D.C. 20036 at a cost of \$3.00 for members or \$5.00 for non-members. The theme of this conference was "Challenges to Defense Management in the Seventies."

This publication contains presentations made by the Honorable David Packard, Deputy Secretary of Defense; Mr. Gilbert Fitzhugh, Chairman, Blue Ribbon Defense Panel; General F. J. Chesarek, Commanding General, Army Materiel Command; Honorable R. L. Johnson, Assistant Secretary of the Army (Research and Development); Honorable P. N. Whittaker, Assistant Secretary of the Air Force (Installations and Logistics); Honorable

Barry Shillito, Assistant Secretary of Defense (Installations and Logistics); Honorable W. K. Brehm, Assistant Secretary of the Army (Manpower and Reserve Affairs); Mr. Bruno Augenstein, Vice President, The RAND Corporation; Vice Admiral J. D. Arnold, Chief of Naval Material; Lieutenant General Samuel Phillips, Commander, Air Force Space and Missile Systems Organization; Mr. Willis Hawkins, Vice President, Science and Engineering, Lockheed Aircraft Corporation; Major General Paul Feyereisen, Army Materiel Command; Mr. Thomas Jones, President, Northrop Corporation; Lieutenant General Austin W. Betts, Chief, Research and Development, Department of the Army; Mr. Robert Anderson, President, North American Rockwell; and Major General Frank Madsen, Commander, Keester Air Force Base.

Address by
THE HONORABLE DAVID PACKARD
Deputy Secretary of Defense
at Armed Forces
Management Association Dinner
International Hotel
Los Angeles, Calif.
Thursday, August 20, 1970

I am delighted to be with you here in Los Angeles tonight. I am sorry I was not able to spend more time at this conference, and particularly sorry not to hear Gil Fitzhugh this noon. He and his Blue Ribbon Panel have done an outstanding job in making recommendations which will improve the operation of the Defense Department.

Secretary Laird and I intend to move ahead as quickly as possible to put most of the 113 recommendations into effect.

I agree in particular with the Committee's recommendation that more decentralization of the Department is necessary. To me that means more decision-making at a lower level and less time-consuming and duplicate second-guessing topside.

This gives me a problem on the recommendation for the three deputies. We do not want to create a structure that adds more top-level involvement in the working man's business. I appreciate the implication that I have to work hard. I do put in long hours. I assure you, however, that much of my time has been spent doing things that lower levels should do. Three deputies would tend to pull even more decision-making up to the top, and we do not want to move in that direction. What we want to do is give a man a job and let him do it.

The report greatly under rates the Joint Chiefs of Staff. I have spent a great deal of time working with the Chiefs during the past year and a half. I found them among the finest, most dedicated, most capable men I have ever known. They have given Secretary Laird and me their complete support and cooperation.

There is no question about civilian control of military operations. Secretary Laird or I approve every operating order; but we do need to streamline the chain of command for operations. This will be done on a careful, step-by-step basis because the problems are complex, and also because we need to assure uninterrupted combat readiness of our forces.

We intend to give the Service Secretaries and the Services more responsibility so that they can do their jobs. Before they can do their jobs right they will have to break down some of the multi-layer staffing that has built up over the years and work together better to avoid unnecessary duplication. In short, the problem is not the people—it's the system. And now, how does this apply to the procurement problem and this meeting you have been holding this week.

I suppose that some of our critics will call this a meeting of the military-industrial complex. So be it. I am not embarrassed by the fact that we need industry to help the Department of Defense. I am only embarrassed that we haven't done a better job. Many of you, and



certainly those *not* in the industry, may expect me to talk about what a grand job we have all done and how necessary we are for one another. I am not going to do that. I am going to talk about the things we do wrong and the things that we have to do better.

Let's face it—the fact is that there has been bad management of many Defense programs in the past. We spend billions of the taxpayers' dollars; sometimes we spend it badly. Part of this is due to basic uncertainties in the Defense business. Some uncertainties will always exist. However, most of it has been due to bad management, both in the Department of Defense and in the Defense industry. We can and are doing something about that. I am not talking just about cost over-runs as so many of our critics do. Over-runs are the end product of our mistakes rather than the key issue to be addressed. I am surprised that our critics took so long to discover cost over-runs. They have been around for a long time, and many of the cost over-runs that receive the most publicity were organized by defense and industry years ago. We are now paying the price for mistakes in contracting, in development and in management.

Frankly, gentlemen, in Defense procurement, we have a real mess on our hands, and the question you and I have to face up to is what are we going to do to clean it up.

Let me first mention two things that won't help.

It won't help for Congress to legislate detailed and inflexible rules governing procurement.

Nor will it help to put the General Accounting Office in the process of making management decisions. The GAO deserves the highest marks for auditing, but the talents of a good auditor are not identical with those of a good manager.

The pressures are strong to insert the Congress and its right arm, the GAO, into the details of day to day management decisions in the Department of Defense. Until we in the Department and you in defense industry demonstrate that we can provide capable and efficient management, these pressures will continue.

I have been in this job now for 19 months. Frankly, I am ashamed I have not been able to do very many of the things that need to be done to improve the situation I found here in January 1969. The most frustrating

thing is that we know how we ought to manage—you, me, all of us—and we refuse to change based on what we know. Every time we want something done in a hurry and want it done right, we have to take the project out of the system. We give a good man direction and authority and let him go—and it works. When we needed sensors in a hurry for Vietnam, we got the best man we could find—General Starbird—gave him all the authority he needed and told him to produce—and he did. And I don't know why anybody would be surprised. His successor, General Lavelle, has had the same authority, has consistently returned money from his budget, has done all the management things that people say you are supposed to do, and meets every requirement—financial, managerial or operational—that we could want. Industry does the same thing. The “Skunk Works” in Lockheed has had tough, complex, expensive and demanding programs. Kelly Johnson produces.

On the other hand, when we are not in a hurry to get things done right, we over-organize, over-man, overspend and under-accomplish. The most dramatic contrast is within Lockheed. Kelly Johnson and his programs, and the Air Force and Lockheed on the C-5A. I simply cannot understand why we are unable to change the system to avoid the C-5As and get more Skunk Works. We must find a way to do this job right, and you bear as much responsibility as I do.

We need good people—and by that I mean you—who will step up to their responsibilities. That is what decentralization is all about.

In the hope you would do this, on May 28 I issued a memorandum of guidelines for Major Weapons System Acquisition. There is nothing in this memorandum that you don't already know. As a matter of fact, the management principles in my memorandum are so simple that anyone who could not have written the memorandum himself doesn't belong in management. Again and again I have made a big point about getting the right man in the right job and giving him authority. But it is just not that simple. Admiral Rickover is a good example. The Admiral is a man of considerable capability. He has his own style, but he produces. He got a program, had to fight the system tooth and nail to get it, challenges the system every chance he gets, but is still

saddled with the system. I had a long talk with him after the 28 May memorandum was published, and it was clear that I hadn't taught him anything about management. He told me that the principles were great but that if we couldn't get to the system that sits on top of the manager, nothing else mattered. He is right.

I know Secretary Laird and I bear the responsibility for the system in the Department of Defense, and I am going to keep working at it. But you in industry bear a similar responsibility, and I expect you to do the same thing.

In my memo I told the Services to select people with the right background and education for management, give them appropriate training, give them recognition, and leave them on the job long enough to get something done.

All four Services have accepted my recommendations—and their letters say that they agree. But on at least two occasions they have taken actions exactly contrary to those suggested. The Air Force and the Navy are both involved. In one case, a small dedicated Air Force team developed the gunships which have been so successful in Vietnam. The Air Force decided to put this program into its formal system. About a month ago I asked when we would be able to get some more gunships. The answer was in two years. That program is now out of the Air Force system, and we will have more gunships in six months.

In the other case the Navy, shortly after agreeing that a good manager should be kept on the job long enough to get it done right, proceeded to promote a key manager at a critical time from an important program to another assignment. The system wins and the cause of good management loses.

In my memo I talked about policies for development of new weapon systems. The lesson that comes through loud and clear here is we should buy *only* what we need—not systems you or anyone else thinks they can develop to do something that doesn't need to be done. The Defense Department has been led down the garden path for years on sophisticated systems that you promised would do all kinds of things for some optimistic cost. Too frequently we have been wrong in listening to

you, and more frequently you have been unable to deliver on either of these promises—what it would do or what it would cost. And we in the past have sometimes been guilty of over-optimism on our cost estimates and over-demanding in our requirements. We share the blame together, but the mistakes of the past cannot be repeated if we are to provide for the nation's defenses in today's climate of a critical public and a critical Congress. We are going to buy only things that we need, and we are going to make sure they work before we buy. The same thought carries over into full-scale development and production. We must know what we are going to do and how to do it before we go into production. We are not going to put things into development until we are sure we need them, and we are not going to put things into production until we are sure that they work.

This has been a short speech. I have tried to speak very frankly and directly this evening because the problem is very real. It is you people here tonight and the Department of Defense that must take action to solve these problems. We recognize that these problems cannot be solved overnight and perhaps some of them cannot be solved at all, but it is very clear that it is unacceptable to continue to do business as we have done it in the past.

The things I have had to say tonight and the things I said in my 28 May memorandum are simple. Many times we have done a bad job—we are going to do a better one. We are going to know what we are doing before we do it, and we are going to manage it better. We have a lot of obstacles in front of us and some of them we created ourselves. We have given our critics the opportunity to find us at fault, and we run the danger that their efforts to direct Defense management will just compound the mistakes in the Department. We don't need more supervision and more people in the act. We need fewer people. The system in the Department of Defense is going to change. Secretary Laird and I are going to demand it. I expect you who are here tonight and everyone else who does business with the Department of Defense to do the same. That is all I have to say.

THE SECRETARY OF DEFENSE

WASHINGTON, D. C. 20301

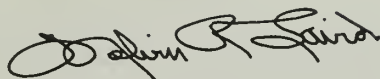
July 28, 1970

MEMORANDUM FOR The Secretaries of the Military Departments
Director, Defense Supply Agency
SUBJECT: Resources Conservation Program

We are now four weeks into a new fiscal year. It will be an austere year by any standards. Military outlays will be down to 7% of gross national product and 34.6% of the total Federal budget. You would have to look back twenty years to find percentages as low.

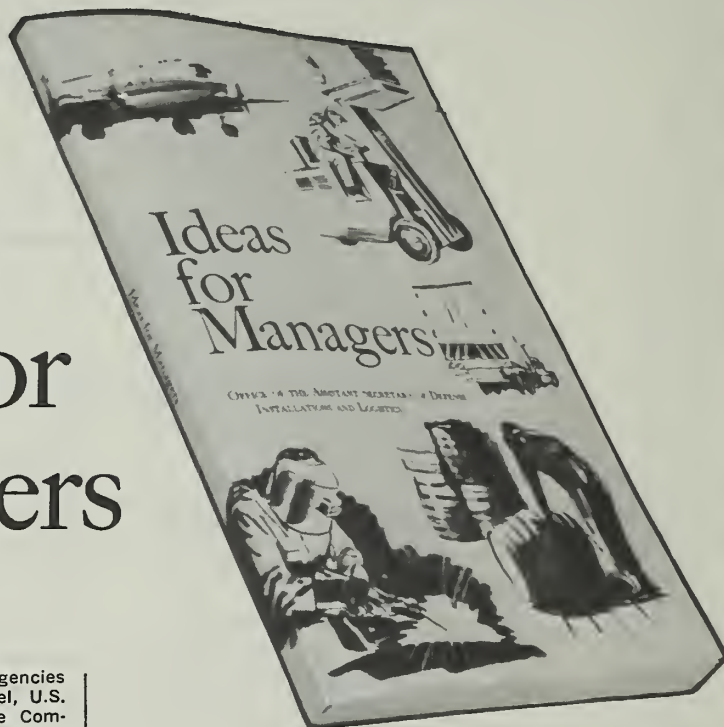
Appreciating the austere nature of our FY 1971 Defense budget and the great need to stretch our financial resources to a maximum to meet our mandatory requirements, it is incumbent on all in Defense to be cost conscious. This means that good money-saving ideas must get around—not remain anchored at home port. It means that every person whose bright idea saves a dollar for Defense should receive the credit due him. It means setting fair, uncomplicated cost reduction goals that really motivate. It means keeping a straight record so that savings can be keyed into the budget—and doing it with less paperwork and fewer headaches.

The Resources Conservation Program (DoD Instruction 7720.6 of 3 July 1970) encourages that kind of dynamic management through every level of the Department of Defense. On 30 June 1971 I expect the record to show that this Program has realized its potential in your organization. Started right and backed by your strong continuing emphasis on its objectives, this Program will produce the efficient, economic operations our budget ceilings demand.





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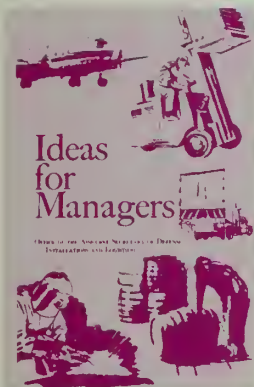
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